

2m4

NASA TECHNICAL MEMORANDUM

NASA TM X-64752
Revision 2

THE OCTOBER 1973 EXPENDABLE LAUNCH VEHICLE TRAFFIC MODEL

By Shuttle Utilization Planning Office
Program Development

January 1974

(NASA-TM-X-64752) THE OCTOBER 1973
EXPENDABLE LAUNCH VEHICLE TRAFFIC MODEL,
REVISION 2 (NASA) 95 p HC \$7.75

74

CSCI 22A

G3/30

Unclass
31266


NASA

*George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama*



I

TECHNICAL REPORT STANDARD TITLE PAGE

1. REPORT NO. TM X-64752 Revision 2		2. GOVERNMENT ACCESSION NO.		3. RECIPIENT'S CATALOG NO.	
4. TITLE AND SUBTITLE The October 1973 Expendable Launch Vehicle Traffic Model Revision 2				5. REPORT DATE January 1974	
				6. PERFORMING ORGANIZATION CODE	
7. AUTHOR(S) Shuttle Utilization Planning Office				8. PERFORMING ORGANIZATION REPORT #	
9. PERFORMING ORGANIZATION NAME AND ADDRESS George C. Marshall Space Flight Center Marshall Space Flight Center, Alabama 35812				10. WORK UNIT NO.	
				11. CONTRACT OR GRANT NO.	
12. SPONSORING AGENCY NAME AND ADDRESS National Aeronautics and Space Administration Washington, D. C. 20546				13. TYPE OF REPORT & PERIOD COVERED Technical Memorandum	
				14. SPONSORING AGENCY CODE	
15. SUPPLEMENTARY NOTES Prepared by Shuttle Utilization Planning Office, Program Development					
16. ABSTRACT Traffic model data for current expendable launch vehicles (assuming no Space Shuttle) for calendar years 1980 through 1991 are presented along with some supporting and summary data. This model was based on a payload program equivalent in scientific return to the October 1973 NASA Payload Model, the NASA estimated non NASA/non DoD Payload Model, and the 1971 DoD Mission Model.					
17. KEY WORDS Expendable Launch Vehicle Traffic Model Payload Mission			18. DISTRIBUTION STATEMENT See document release form <i>Unlimited per TMX-64751</i>  Leon Allen, PD-PL		
19. SECURITY CLASSIF. (of this report) Unclassified		20. SECURITY CLASSIF. (of this page) Unclassified		21. NO. OF PAGES 94	
				22. PRICE NTIS	

ACKNOWLEDGMENT

The data contained in this document were developed jointly by the Mission and Payload Integration Office of NASA Headquarters, Washington, D. C., and the Program Development Directorate of Marshall Space Flight Center, Huntsville, Alabama, under the overall direction of Mr. William O. Armstrong, NASA Headquarters, Washington, D. C. and Mr. William A. Huff, Marshall Space Flight Center, Alabama. Mr. Mac Croft of Marshall Space Flight Center was responsible for directing the capture analysis activities leading to this document.

TABLE OF CONTENTS

	Page
SUMMARY.....	1
INTRODUCTION.....	1
GROUND RULES.....	15
GLOSSARY.....	17
EXPLANATION OF COLUMN HEADINGS FOR CARGO MANIFEST.....	25
APPENDIX — EXPENDABLE LAUNCH VEHICLE FLEET CHARACTERISTICS.....	85

PRECEDING PAGE BLANK NOT FILMED

LIST OF TABLES

Table	Title	Page
1.	1973-1991 Total Expendable Payload Summary	2
2-A.	Equivalent Payload Schedule (Astronomy Program)	3
2-B.	Equivalent Payload Schedule (Physics Program)	4
2-C.	Equivalent Payload Schedule (Planetary Exploration Program)	5
2-D.	Equivalent Payload Schedule (Lunar Exploration Program) . . .	6
2-E.	Equivalent Payload Schedule (Life Sciences Program)	7
2-F.	Equivalent Payload Schedule (Earth Observation Program) . . .	8
2-G.	Equivalent Payload Schedule (Earth and Ocean Physics Application Program)	9
2-H.	Equivalent Payload Schedule (Communications and Navigation Program)	10
2-I.	Equivalent Payload Schedule (Space Processing Program) . . .	11
2-J.	Equivalent Payload Schedule (Space Technology Program) . . .	12
2-K.	Equivalent Payload Summary (Non-NASA/Non-DoD Payloads)	13
2-L.	Equivalent Payload Schedule (Sortie Equivalent — Space Station)	14
3.	Expendable Launch Vehicles and Expendable Payloads, Supplementary Sounding Rocket and Balloon Requirements (Sortie Equivalent)	23
4.	Expendable Launch Vehicle Nomenclature	24
5.	Expendable Launch Vehicle Cargo Manifest	27

LIST OF TABLES (Concluded)

Table	Title	Page
6.	Expendable Launch Vehicles and Expendable Payloads Summary Schedule, NASA and Non-NASA/Non-DoD.	83
7.	Expendable Launch Vehicles and Expendable Payloads Summary Schedule, Total.	84
A-1.	Description and Characteristics of the Expendable Launch Vehicles Used.	86

THE OCTOBER 1973 EXPENDABLE LAUNCH VEHICLE TRAFFIC MODEL

SUMMARY

Traffic model data for current expendable launch vehicles (assuming no Space Shuttle) for calendar years 1980 through 1991 are presented along with some supporting and summary data. This model was based on a payload program equivalent in scientific return to the October 1973 NASA Payload Model, the NASA estimated non-NASA/non-DoD Payload Model, and the 1971 DoD Mission Model.

This document is intended for NASA planning purposes only. The payload data in this document do not represent approved program information. The data were generated for comparison purposes in the economic analysis of the Space Transportation System (Space Shuttle and Tug) and the primary payload carrier, the Sortie Lab.

INTRODUCTION

Current expendable launch vehicles and their derivatives are used to capture the NASA, Non-NASA/Non-DoD, and DoD payload models. The current expendable payload model (Tables 1 and 2) was derived by deleting those missions which are considered to be Space Shuttle benefits (sorties, revisits) and by adding extra satellites to maintain consistent program objectives and life without revisit or in-orbit maintenance and refurbishment flights. The sortie equivalent missions were selected based on the most cost-effective approach to accomplish the same scientific objectives.

The automated missions were captured with Scout, Delta, and Titan launch vehicles and their derivatives. Multiple payloads were flown together when consistent with performance and size constraints. DoD payloads were not flown with non-DoD payloads.

The best mix payload weights listed in the manifest will not necessarily agree with the weights listed in the 1973 NASA Payload Model due to the low cost designs used in the best mix payloads.

The launch vehicle fleet utilized in this analysis is described in the Appendix.

TABLE 1. 1973-1991 TOTAL EXPENDABLE PAYLOAD SUMMARY

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Total
<u>NASA</u>																				
Automated	6	8	7	8	12	9	15	22	21	13	13	17	22	21	19	13	16	19	17	278
Sortie Equivalent	0	0	0	0	0	0	0	7	4	6	5	9	8	11	9	7	6	12	6	90
Total	6	8	7	8	12	9	15	29	25	19	18	26	30	32	28	20	22	31	23	368
<u>Non-NASA/Non-DoD</u>																				
Automated	6	10	10	8	9	13	7	8	10	9	10	8	9	12	6	19	9	17	8	188
Sortie Equivalent	0	0	0	0	0	0	0	2	1	3	3	3	3	4	2	3	2	3	1	30
Total	6	10	10	8	9	13	7	10	11	12	13	11	12	16	8	22	11	20	9	218
<u>Space Station</u>																				
Sortie Equivalent (Used By Both NASA and Non-NASA/Non DoD)	0	0	0	0	0	0	0	5	5	5	5	5	5	5	5	5	5	5	5	60
<u>DoD</u>								34	18	21	32	28	25	23	25	25	25	26	21	303
Grand Total	12	18	17	16	21	22	22	78	59	57	68	70	72	76	66	72	63	82	58	949

TABLE 2-A. EQUIVALENT PAYLOAD SCHEDULE (ASTRONOMY PROGRAM)

Payload Code	Payload	CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	<u>Automated Spacecraft</u>																					
AST-1	Explorers		②	①	②	①	①	②	1	2	1	1	2	1	2	1	2	1	1	1	1	26
AST-2	Orbiting Solar Obs.			①																		1
AST-3	Solar Max Satellite							1		1		1		1		1		1		1		7
AST-4	High Energy Astr. Obs. A-C					①	①	①		1												4
	<u>Large Observatories</u>																					
AST-5	High Energy Astr. Obs. D+E											1		1		1		1		1		5
AST-6	Large Space Telescope									1		1		1		1		1		1		6
AST-7	Large Solar Obs														1		1		1		1	4
AST-8	Large Radio Obs.														1		1		1		1	4
AST-9A	Focusing X-Ray Telescope												1				1				1	3
AST-9B	Focusing X-Ray Telescope														1				1			2
	Total Autom.		2	2	2	2	3	3	1	5	1	4	3	4	5	4	5	4	4	4	4	62
	<u>Sortie Equivalent Payloads</u>																					
AST-10(1)	Infrared Astr.										1		1		1		1		1		1	6
AST-10(2)	Infrared SM Telescope											1				1				1		3
AST-10(3)	Ultraviolet ASTR-IM													1		1		1		1		4
AST-10(4)	UV ASTR Survey													1							1	2
AST-10(5)	X-Ray & UV Astr.																1		1		1	3
AST-10(6)	Explorer												1	1	1	1	1	1	1	1	1	9
AST-11	Solar Physics – EOSO									1		1		1		1		1		1		6

Note: ○ Approved and Ongoing

TABLE 2-B. EQUIVALENT PAYLOAD SCHEDULE (PHYSICS PROGRAM)

Payload Code	Payload	CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	<u>Automated Spacecraft</u>																					
PHY-1	Explorers		②	①	②	①	②	①	2	1	2	1	1	2	1	1	1	2	2	2	2	29
PHY-2	Grav. & Rel. Sat.									1			1			1				1		4
PHY-3	Environ. Perturb. Sat.										1			1			1			1		4
PHY-4	Helio. & Interstel. S/C																	1				1
	<u>Large Observatories</u>																					
PHY-5	Cosmic-Ray Laboratory																1		1		1	3
	Total Autom.		2	1	2	1	2	1	2	2	3	1	2	3	1	2	3	3	3	3	4	41
	<u>Sortie Equivalent Payloads</u>																					
PHY-6	Cosmic X-Ray Exper.											1		1		1			1			4
PHY-7(1)	MHD Exper.										1			1				1				3
PHY-7(2)	Particle Inject Exper.												1		1		1			1		4
PHY-7(3)	Atmospheric Science														1					1		2
PHY-7(4)	Auroral Observation																1			1		2
PHY-7(5)	Chemical Release														2		2			2		6

Note: ○ Approved and Ongoing

TABLE 2-C. EQUIVALENT PAYLOAD SCHEDULE (PLANETARY EXPLORATION PROGRAM)

Payload Code	Payload	CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	<u>Approved Programs</u>																					
PL-1	Mariner Venus/Mercury		①																			1
PL-2	Pioneer Jupiter Flyby		△																			0
PL-3	Helios			①		①																2
PL-4	Viking 75				②																	2
PL-5	Mariner Jup/Sat 77						②															2
	<u>Inner Planets</u>																					
PL-6	Viking Orbiter/Lander 79								1													1
PL-7	Surface Sample Return													2								2
PL-8	Satellite Sample Return																		1	1		2
PL-9	Pioneer Venus							2														2
PL-10	Inner Pl. Follow-On									1	2		1			1						5
PL-11	Venus Radar Mapper												2									2
PL-12	Venus Buoyant Station													2								2
PL-13	Mercury Orbiter														2		2					2
PL-14	Venus Large Lander																	2				2
	<u>Outer Planets</u>																					
PL-15	Mariner Jup/Uranus Flyby								2													2
PL-16	Pioneer Jup/Uranus Flyby (Uranus Probe)								1													1
PL-17	Pioneer Saturn Probe									1												1
PL-18	Pioneer Sat/Uranus Flyby (U Probe)										1											1
PL-19	Mariner Jupiter Orbiter										2											2
PL-20	Pioneer Jupiter Orbiter																					2
PL-21	Mariner Saturn Orbiter													2	2							2
PL-22	Mariner Uranus/Nep Flyby															2						2
PL-23	Jupiter Sat. Orb/Lander																		1	1		2
	<u>Comets & Asteroids</u>																					
PL-24	Dual Comet Flyby					1																1
PL-25	Encke Slow Flyby								1													1
PL-26	Encke Rendezvous									2												2
PL-27	Halley Flyby														1							1
PL-28	Asteroid Rendezvous															2						2
	Total		1	1	2	2	2	2	5	2	7	0	3	4	5	5	2	0	2	2	2	49

Note: ○ Approved and Ongoing
 △ Launched

TABLE 2-D. EQUIVALENT PAYLOAD SCHEDULE (LUNAR EXPLORATION PROGRAM)

[illegible]

TABLE 2-E. EQUIVALENT PAYLOAD SCHEDULE (LIFE SCIENCES PROGRAM)

Payload Code	Payload	CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
LS-1	<u>Automated Spacecraft</u>																					
	Life Sciences Research Module					1			1	2	2	2	2	2	2	2	2	2	2	2	2	26
	Total Autom.					1			1	2	2	2	2	2	2	2	2	2	2	2	2	26
LS-2	<u>Sortie Equivalent Payloads</u>																					
	Life Science Module									1						1						2

TABLE 2-F. EQUIVALENT PAYLOAD SCHEDULE (EARTH OBSERVATION PROGRAM)

Payload Code	Payload	CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	<u>Automated Spacecraft</u>																					
EO-1	Earth Resources Tech. Sat.					①																1
EO-2	NIMBUS			①		①																2
EO-3A	Earth Observatory Sat.							1				1				1			1			4
EO-3B	Earth Observatory Sat.								1			1			1			1			1	5
EO-3C	Earth Observatory Sat.										1			1			1			1		4
EO-3D	Earth Observatory Sat.									1												1
EO-4	Syn. Earth Obs. Sat.										1		1		1		2		2		2	9
EO-5	Special Purpose Sat.					1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	19
EO-6	TIROS						①					1					1					3
EO-7	Syn. Meteorological Sat.			①	①			1									1					4
	Total Autom.		1	2		2	3	3	3	3	4	3	3	2	3	2	6	2	4	2	4	52
	<u>Sortie Equivalent Payloads</u>																					
EO-8(1)	Earth Obs. Sat.									1	1	1	1	1	1	1	1	1	1	1	1	12

Note: ○ Approved and Ongoing

TABLE 2-G. EQUIVALENT PAYLOAD SCHEDULE (EARTH AND OCEAN PHYSICS APPLICATION PROGRAM)

Payload Code	Payload	CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	<u>Automated Spacecraft</u>																					
EOP-1	Geodetic Earth Orbiting Sat.			①																		1
EOP-2	Laser Geodynamic Sat.					①																1
EOP-3	SEASAT						1					1										2
EOP-4	GEOPAUSE								1			1										2
EOP-5	Grav. Gradiometer									1												1
EOP-6	Mini-Laser Geodynamic Sat.									6					6							12
EOP-7	GRAVSAT								1													1
EOP-8	Vector Magnetometer Sat.										3					3				3		9
EOP-9	Magnetic Monitor Sat.										1					1				1		3
	Total Autom.			1		1	1		2	7	4	2		6	4					4		32
	<u>Sortie Equivalent Payloads</u>																					
EOP-10(1)	EOPAP - Ocean Dynamics									1		1		1		1		1		1		6
EOP-10(2)	EOPAP - Earth Dynamics										1		1		1		1		1		1	6

Notes:

○ Approved and Ongoing

TABLE 2-H. EQUIVALENT PAYLOAD SCHEDULE (COMMUNICATIONS AND NAVIGATION PROGRAM)

Payload Code	Payload	CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	<u>Automated Spacecraft</u>																					
C/N-1	Applic. Tech. Sat.			①																		1
C/N-2	Coop. Applic. Sat.				①																	1
	Total			1	1																	2
	<u>Sortie Equivalent Payloads</u>																					
C/N-4	COMM/NAV-ATS									1		1		1		1		1		1		6

Note:

○ Approved and Ongoing

TABLE 2-1. EQUIVALENT PAYLOAD SCHEDULE (SPACE PROCESSING PROGRAM)

Payload Code	Payload	CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	<u>Sortie Equivalent Payloads</u>																					
SP-1	Space Proc. Module									1						1						2

TABLE 2-J. EQUIVALENT PAYLOAD SCHEDULE (SPACE TECHNOLOGY PROGRAM)

Payload Code	Payload	CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
ST-1	<u>Automated Spacecraft</u>																					
	Long Duration Exposure Mod.									1		1		1		1		1		1		6
	Total Autom.									1		1		1		1		1		1		6
ST-2	<u>Sortie Equivalent Payloads</u>																					
	Adv. Tech. Module									1						1						2

TABLE 2-K. EQUIVALENT PAYLOAD SUMMARY (NON-NASA/NON-DoD PAYLOADS)

Payload Code		CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	<u>Comm/Nav</u>																					
NN/D-1	International Comm.		3	1	2	1	1	1	2	3			2	3	2	2			2	3	2	30
NN/D-2	U.S. Domestic			7	3	1	1	4	1	1	2	2	4	1	1	2	2	6	2	2	1	43
NN/D-3	Disaster Warning										1	1			1					1		4
NN/D-4	Traffic Management					2	1	3	1	2	2	1	1	1		1		1		1		17
NN/D-5	Foreign Comm.		2	1	3	2	3	1			1	1	1	1	1	1	1	1	1	1	1	23
NN/D-6	Communication R&D/Prototype														1			1		1		3
	<u>Earth Observations</u>																					
NN/D-7	Tiros Operational Sat.		1	1	1	1	1	1	1													7
NN/D-8	Environ. Monitoring Sat.									1	1	1			1	1	1	1		1	1	9
NN/D-9	Foreign Syn. Met. Sat. (2 Systems)							1			1	1		1		1		1		1		7
NN/D-10	Geosyn. Oper. Environmental Sat.				1	1	1	1	1		1	1	1		1		1	1	1		1	13
	<u>Earth Resources Sat.</u>																					
NN/D-11	Low Earth Orbit (2 Systems)						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
NN/D-12	Geosynchronous																	2		2		4
NN/D-13	Foreign Syn. Earth Obs. Sat.																	1	2		1	4
	<u>Earth and Ocean Physics</u>																					
NN/D-14	Global Earth & Ocean Monit. Sys.															3		3		3		9
	Total Autom.		6	10	10	8	9	13	7	8	10	9	10	8	9	12	6	19	9	17	8	188
	<u>Sortie Equivalent Payloads</u>																					
SP-1	Space Proc. Module									1						1						2
NN/D-15	Foreign Earth Obs.									1		1		1		1		1		1		6
NN/D-16a	Foreign Astronomy											1	1	1	1	1	1	1	1	1		9
NN/D-16c(1)	Foreign Atmospheric & Space Physics													1								1
NN/D-16c(2)	Foreign Comm./Nav.									1	1	1	1	1	1	1	1	1	1	1	1	12
NN/D-16d(1)	Foreign Solar Physics												1									1
NN/D-16d(2)	Foreign High Energy															1						1

TABLE 2-L. EQUIVALENT PAYLOAD SCHEDULE (SORTIE EQUIVALENT - SPACE STATION)

[illegible]

GROUND RULES

Payload Model

- The payload model for NASA Shuttle missions in the 1980-1991 period assumed an average NASA budget of \$3.3B (1972 constant dollars).
- Analysis based on NASA/Non-NASA/Non-DoD payloads defined in the 1973 NASA Payload Model dated October 1973.
- DoD Payload Model is August 1971 (updated), Option B.

Automated Payloads

- Program content for NASA payloads provided by NASA discipline offices.
- Foreign program content provided by NASA discipline offices and reviewed by the European Space Research Organization (ESRO).
- Non-NASA/Non-DoD program content synthesized from discipline office interpretation of current user planning.
- Payload designs and costing utilize data base resulting from LMSC, TRW, and Aerospace analysis.

Spacelab Payloads

- NASA Spacelab payloads derived from NASA/scientific community working groups and coordinated by the Joint User Requirements Group (JURG).
- Spacelab payloads configured to the expendable launch vehicle mode based on the most effective approach to accomplish the same scientific objectives.
- Spacelab equivalent for the expendable mode accomplished by:
 - Three-man Space Station (available in CY-1980).
 - Core station (crew, power, and general purpose lab).

- Ninety-day crew rotation.
- Experiment time equivalent to Spacelab/Shuttle time.
- T-IIIM/Big "G" logistics support.
- Automoted payloads.
- Sounding rockets.
- Balloons.

Expendable Launch Vehicles

- For automated missions: Scout, TAT, Atlas/Centaur, Titan derivatives.
- Direct operating costs reflect rate effects.

Launch Sites

- ETR and WTR available as required for entire time span.

Cost/Capture Analysis

- Low cost effects incorporated where applicable into payload designs for use for the expendable launch vehicles.
- Titan solid rocket motors to be recovered and reused in expendable launch vehicle case.
- 1980 through 1991 time span assumed for analysis.
- Post-1991 (1992-1998) payload model synthesized to avoid program "tailoff."
- Multiple payloads permitted on expendable cases.
- DoD payloads not be combined with non-DoD payloads.
- Costs include reliability effects of vehicles and payloads.
- All costs in 1972 constant dollars.

GLOSSARY

Adv.	Advanced
Alt.	Altitude
Appl.	Applications
ASTR	Astronomy
Atm.	Atmosphere
ATS	Applications Technology Satellite
AU	Astronomical Unit (means distance from sun to earth)
Auto.	Automated
Big G	Big Gemini, manned ballistic recovery vehicle
Bio.	Biological
CDE, CE	Current Design Expendable
CDR, CR	Current Design Reusable
Comm.	Communications
CPM	Cargo Propulsion Module
CRL	Code for NASA Crew Rotation and Logistics payloads
D	DoD (Department of Defense)
deg	Degrees
Delta	Refers to Delta launch vehicle
Dem.	Demonstration
Demo	Demonstration

GLOSSARY (Continued)

Dur.	Duration
Encke	Name of comet
Environ.	Environment
EOPAP (EOP)	Earth and Ocean Physics Applications Program
EOSO	Earth Orbiting Solar Observatory
Eq.	Equatorial
Escape	Refers to escape from solar system
Exper.	Experiment
Explorer	Small general purpose spacecraft
G	Gemini
Geopause	Satellite in Earth and Ocean Physics Applications Program
GEOS	Geodetic Satellite
GEOSYN	Geosynchronous orbit
Grav.	Gravity
HA	Height of orbit at apogee
Halo	Lunar orbiting communication satellite
HEAO	High Energy Astronomy Observatory
Helioc	Heliocentric

GLOSSARY (Continued)

Hi	High
HP	Height of orbit at perigee
Incl. (Inc.)	Inclination
Inject.	Injection
Intelsat	Communications satellite
Interpl.	Interplanetary
Interstel.	Interstellar
IOC	Initial Operational Capability
IR	Infrared
Jup.	Jupiter
KSC	John F. Kennedy Space Center
Lab.	Laboratory
LAGEOS	Laser Geodynamic Satellite
LCE	Low Cost Expendable
L/D	Length/diameter in feet
LEO	Low Earth Orbit
LHET	Large High Energy Telescope
Log	Logistics
LRO	Large Radio Observatory
LSO	Large Space Observatory

GLOSSARY (Continued)

LST	Large Space Telescope
Magnet.	Magnetic
Mariner	Planetary spacecraft
Max.	Maximum
Med.	Medium
Meteor. (Met.)	Meteorological
MHD	Magnetohydrodynamic
Mini	Small
Mod.	Module
Monit.	Monitoring
Nav.	Navigation
Nept.	Neptune
n. mi.	Nautical miles
N-P	Refers to mission number
OA	Code for NASA earth observation sortie equivalent payloads
Obs.	Observation
Observ.	Observatory
Oper.	Operational
Orbit (Orb.)	Altitude in nautical miles/inclination in degrees (both apogee and perigee shown for elliptical orbits)

GLOSSARY (Continued)

OTDA	Office of Tracking and Data Acquisition
PA	Code for NASA astronomy sortie equivalent payloads
Pert.	Perturbation
P/L	Payload
Plan. (Pl.)	Planetary
Proc.	Processing
Proto.	Prototype
R&D	Research and development
Relat. (Rel.)	Relativity
Rend.	Rendezvous
Revisits	Rendezvous with orbiting spacecraft for maintenance and data retrieval
Samp.	Sample
Sat.	Satellite
Satn.	Saturn
SATS	Small Applications Technology Satellite
Sat. /Uran.	Saturn/Uranus
Scout	Refers to Scout launch vehicle
SEASAT	Seastate Satellite for ocean physics
SEOS	Synchronous Earth Observation Satellite

GLOSSARY (Concluded)

Sortie	Spacelab (including pallet when applicable)
S.S.	Space Station
Surf.	Surface
Syn., Sync.	Geosynchronous orbit
TDRS	Tracking and Data Relay Satellite
Tech.	Technology
Telesc.	Telescope
Tiros	Meteorology satellite
Track.	Tracking
U-Probe	Uranus probe
Uran.	Uranus
U. S.	United States
UV	Ultraviolet
Varies	Refers to multiple payload destinations and/or descriptions
Viking	Mars soft lander
WTR	Western Test Range
"X"	Refers to unspecified comet mission
XUV	Extreme ultraviolet

TABLE 3. EXPENDABLE LAUNCH VEHICLES AND CURRENT EXPENDABLE PAYLOADS
SUPPLEMENTARY SOUNDING ROCKET AND BALLOON REQUIREMENTS (SORTIE EQUIVALENT)

Payload Program	80	81	82	83	84	85	86	87	88	89	90	91	Total
Space Physics													
Sounding Rockets	2	8	10	10	11	16	11	11	11	11	16	11	128
Astrophysics													
Balloons	60	60	60	60	60	60	60	60	60	60	60	60	720
Astronomy													
Sounding Rockets	28	28	30	30	32	32	32	32	32	33	33	33	375
Solar Physics													
Sounding Rockets	22	22	22	32	32	32	42	52	52	54	54	54	470
Balloons	13	6	6	5	3	3	2	2	2	2	2	2	48
Total													
Sounding Rockets	52	58	62	72	75	80	85	95	95	98	103	98	973
Balloons	73	66	66	65	63	63	62	62	62	62	62	62	768

TABLE 4. EXPENDABLE LAUNCH VEHICLE NOMENCLATURE

Vehicle	Description
Delta 300	3 Caster II augmentation motors on standard long tank Thor with standard second stage
Delta 304	Delta 300 with TE 364-4 motor third stage
Delta 600	6 Caster II augmentation motors on standard long tank Thor with standard second stage
Delta 604	Delta 600 with TE 364-4 motor third stage
Delta 900	9 Caster II augmentation motors on standard long tank Thor with standard second stage
Delta 904	Delta 900 with TE 364-4 motor third stage
THIB	2 stage standard Core I and II
THIB/A	THIB with Agena added
THIC	Two 5-segment, 120-in. solids, standard Core I and II, transtage
THID	THIC with transtage removed
THID/C	THID with Centaur added
THID/BII	THID with Burner II added
THID7	Two 7-segment, 120-in. solids, stretched Core I and standard Core II
THID7/C	THID7 with Centaur added
THID7/BII	THID7 with Burner II added
THID7/C/BII	THID7 with Centaur and Burner II added
THIB/C/BII	THIB with Centaur and Burner II added
THIM	Man-rated THID7
Scout	4-stage solid

EXPLANATION OF COLUMN HEADINGS FOR CARGO MANIFEST

<u>Heading</u>	<u>Explanation</u>
FLIGHT NO.	Flight number, a number used purely for reference and does not indicate the launch sequence. A "D" following the flight number indicates a DoD flight.
LAUNCH SITE	Launch site; KSC, Kennedy Space Center; WTR, Western Test Range.
LAUNCH VEHICLE	Vehicle used to launch payload.
CODE	Payload code. () Payload Subgroup
NAME	Payload name.
TYPE	Payload type. CDE — Current design expendable LCE — Low cost expendable
WEIGHT	Payload launch weight in lb.
L/D	Payload length and diameter in feet.
ORBIT HA/HP/INC	Payload orbit: HA - Apogee in n. mi. HP - Perigee in n. mi. INC - Inclination in degrees
CARGO WEIGHT	Sum of all payload weights.
CARGO LENGTH	Sum of lengths of all payloads.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST

Year 1980										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
1	KSC	THHD/C	NN/D-4	Traffic Management	CE	703	12.0/7.2	Syn. Eq.	1 406	24.0
			NN/D-4	Traffic Management	CE	703	12.0/7.2	Syn. Eq.		
2	KSC	THHD/C	NN/D-1	Intelsat	CE	3 988	9.8/8.3	Syn. Eq.	4 663	19.5
			EO-5A	Special Purpose Sat. Syn.	LCE	675	9.7/4.7	Syn. Eq.		
3	KSC	THHD/C	NN/D-1	Intelsat	CE	3 988	9.8/8.3	Syn. Eq.	5 045	20.9
			NN/D-2A	U.S. Dom. Com. Sat. -A	LCE	1 057	11.1/7.6	Syn. Eq.		
4	KSC	THHD/C	NN/D-1	Intelsat	CE	3 988	9.8/8.3	Syn. Eq.	3 988	9.8
5	WTR	Delta 300	NN/D-8	Environ. Man. Sat.	CE	1 414	13.0/8.0	920/920/103	1 414	13.0
6	WTR	Delta 300	EO-5B	Special Purpose Sat. Polar	LCE	675	9.7/4.7	3000/300/90	675	9.7
7	WTR	Scout	EOP-6C	Mini-Lageos	CE	225	1.6/1.6	350/350/90	225	1.6
8	WTR	Scout	EOP-6C	Mini-Lageos	CE	225	1.6/1.6	350/350/90	225	1.6
9	KSC	Scout	EOP-6A	Mini-Lageos	CE	225	1.6/1.6	350/350/28.5	225	1.6
10	KSC	Scout	EOP-6A	Mini-Lageos	CE	225	1.6/1.6	350/350/28.5	225	1.6
11	KSC	Scout	EOP-6B	Mini-Lageos	CE	225	1.6/1.6	350/350/55	225	1.6
12	KSC	Scout	EOP-6B	Mini-Lageos	CE	225	1.6/1.6	350/350/55	225	1.6
13	KSC	Delta 304	AST-1B	Explorer-Syn.	CE	462	9.9/2.6	19 323/19 323/28.5	462	9.9
14	KSC	THHD/BII	AST-6	LST	CE	20 639	36.3/12.0	340/340/28.5	20 639	36.3

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1980 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
15	KSC	THHB/C/BII	PL-10	Innerplanetary Follow-on	CE	1 857	9.0/9.0	-	1 857	9.0
16	WTR	Delta 900	Phy-2A	Gravity/Relativity Sat. -A	LCE	2 514	13.6/12.5	500/500/90	2 514	13.6
17	KSC	THHD7/C/BII	PL-17	Pioneer Saturn Probe	CE	1 329	11.0/7.0	-	1 329	11.0
18	KSC	THHD7/BII	LS-2	Life Science Module	LCE	25 700	30.0/14.0	270/270/55	25 700	30.0
19	KSC	THHC	AST-11	Solar Physics-EOSO	LCE	19 000	12.0/8.0	550/550/27.5	19 000	12.0
20	KSC	THHD7	SPST MOD-1	Crew Module - S.S.	LCE	20 400	45.5/14.0	270/270/55	20 400	45.5
21	KSC	THHD7	SPST MOD-2	Power Module - S.S.	LCE	20 400	58.5/14.0	270/270/55	20 400	58.5
22	KSC	THHD7	SPST MOD-3	Operations Module - S.S.	LCE	20 400	45.5/14.0	270/270/55	20 400	45.5
23	KSC	THHD7	ST-2	Advanced Technology Module	LCE	19 300	32.0/14.0	270/270/55	19 300	32.0
24	KSC	THHD7	SP-1/NN/D-15	Space Processing Module	LCE	17 400	30.0/14.0	270/270/55	17 400	30.0
25	KSC	THHD	ST-1	Long Duration Exposure Facility	CE	10 200	37.0/14.0	270/270/28.5	10 200	37.0
26	WTR	THHD	EOP-5	Gravity Gradiometer	LCE	10 236	30.2/14.7	108/108/90	10 236	30.2
27	WTR	THHB/C	EO-3D	EOS-D	LCE	6 630	36.0/10.2	494/494/99	6 630	36.0
28	WTR	THHB/C	NN/D-16A(1)	Earth Obs.	LCE	6 635	45.0/10.0	500/500/98	6 635	45.0
29	WTR	THHB/C	EOP-10(1)	EOPAP-Ocean Dynamics	LCE	4 758	13.5/12.3	450/450/90	4 758	13.5
30	KSC	THHB/A	Phy-1C	Explorer - High Altitude	CE	720	9.0/4.0	-	720	9.0

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1980 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
31	KSC	THIB/A	AST-3	Solar Physics Mission	LCE	4 281	13.1/11.6	270/270/30	4 281	13.1
32	KSC	THIB/A	AST-4	HEAO-C	CE	6 064	18.1/9.0	250/250/28.5	6 064	18.1
33	KSC	THIB/A	C/N-4	Comm/Nav.	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
34	KSC	Delta 300	AST-1A	Explorer - LEO	CE	462	9.9/2.6	297/297/28.5	462	9.9
35	KSC	Delta 300	LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5	982	21.4
			IS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5		
36	WTR	THIB/C	NN/D-11	Earth Resources Sat - LEO	LCE	6 630	36.1/10.2	500/500/97	6 630	36.1
37	WTR	THIB/C	EO-8(1)	Earth Obs. Sat.	LCE	4 758	13.5/12.2	500/500/98	4 758	13.5
38	KSC	THIB/A	NN/D-16 C(2)	Com/Nav	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
39	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
40	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1980 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. ml./n. mi./deg)	Weight (lb)	Length (ft)
41 _D	WTR									
42 _D	WTR									
43 _D	WTR									
44 _D	WTR									
45 _D	WTR									
46 _D	KSC									
47 _D	KSC									
48 _D	KSC									
49 _D	KSC									
50 _D	KSC									
51 _D	KSC									
52 _D	KSC									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1980 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
53 _D	KSC									
54 _D	KSC									
55 _D	WTR									
56 _D	WTR									
57 _D	WTR									
58 _D	WTR									
59 _D	WTR									
60 _D	WTR									
61 _D	WTR									
62 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1981										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
1	KSC	THHD/C	NN/D-9	Foreign Geosyn Met. Sat.	CE	596	8.0/6.0	Syn. Eq.	2 040	29.9
			NN/D-4	Traffic Management	CE	703	12.0/7.2	Syn. Eq.		
			NN/D-5	Foreign Com Sat.	CE	741	9.9/5.8	Syn. Eq.		
2	KSC	THHD/C	NN/D-4	Traffic Management	CE	703	12.0/7.2	Syn. Eq.	1 760	23.1
			NN/D-2A	U.S. Dom. Com. Sat-A	LCE	1 057	11.1/7.6	Syn. Eq.		
3	KSC	THHD/C	NN/D-2A	U.S. Dom. Com. Sat-A	LCE	1 057	11.1/7.6	Syn. Eq.	3 006	22.4
			NN/D-3	Disaster Warning Sat.	LCE	1 949	11.3/8.0	Syn. Eq.		
4	KSC	THHD/C	EO-4A	SEOS R&D	LCE	5 168	13.8/12.9	Syn. Eq.	6 245	24.7
			NN/D-10	Geosyn. Oper. Met. Sat.	LCE	1 077	10.9/7.2	Syn. Eq.		
5	KSC	Delta 300	EOP-9	Magnetic Monitor Sat.	LCE	847	10.1/5.6	1080/540/28.0	847	10.1
6	WTR	Delta 300	Phy-1A	Explorer-Upper Atmosphere	CE	1 240	11.0/4.0	1900/140/90	1 240	11.0
7	WTR	Delta 300	NN/D-8	Environ. Mon. Sat.	CE	1 414	13.0/8.0	920/920/103	1 414	13.0
8	WTR	Delta 300	EO-5C	Special Purpose Sat. Polar	LCE	675	9.7/4.7	280/280/90	1 350	19.4
			EO-5C	Special Purpose Sat. Polar	LCE	675	9.7/4.7	280/280/90		
9	WTR	Delta 300	EOP-8	Vector Magnetometer Sat.	LCE	1 101	10.4/6.0	216/216/90	2 202	20.8
			EOP-8	Vector Magnetometer Sat.	LCE	1 101	10.4/6.0	216/216/90		
10	WTR	Delta 300	EOP-8	Vector Magnetometer Sat.	LCE	1 101	10.4/6.0	216/216/90	1 101	10.4
11	KSC	Delta 304	Phy-1B	Explorer - Medium Alt.	CE	641	10.5/5.0	20000/1000/28.5	641	10.5
12	KSC	THHD7/C	PL-19	Mariner Jupiter Orbiter	LCE	5 804	35.6/14.7	-	5 804	35.6

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1981 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
13	KSC	THHD7/C	PL-19	Mariner Jupiter Orbiter	LCE	5 804	35.6/14.7	-	5 804	35.6
14	KSC	THHB/C/BII	PL-10	Innerplanetary Follow-on	CE	1 857	9.0/9.0	-	1 857	9.0
15	KSC	THHB/C/BII	PL-10	Innerplanetary Follow-on	CE	1 857	9.0/9.0	-	1 857	9.0
16	KSC	THHD7/C/BII	PL-18	Pioneer Saturn/Uranus flyby	CE	1 329	11.0/7.0	-	1 329	11.0
17	KSC	THHC	Phy-3A	Environ Pert Sat. A	LCE	5 522	14.0/13.3	6900/6900/55	5 522	14.0
18	KSC	THHC	AST-10(1)	Infrared Astr.	LCE	21 000	12.0/8.0	700/700/28.5	21 000	12.0
19	KSC	THHD	Phy-7-(1A)	MHD Experiment	LCE	20 000	12.0/8.0	200/200/28.5	20 000	12.0
20	WTR	THHB/C	EO-3C	EOS- C	LCE	6 630	36.0/10.2	494/494/99	6 630	36.0
21	KSC	THHB/A	EOP-10(2)	EOPAP-Earth Dynamics	LCE	4 758	13.5/12.3	450/450/28.5	4 758	13.5
22	KSC	THHD/C	PL-26	Comet Encke Rend.	LCE	7 968	17.6/14.7	-	7 968	17.6
23	KSC	THHD/C	PL-26	Comet Encke Rend.	LCE	7 968	17.6/14.7	-	7 968	17.6
24	KSC	Delta 300	AST-1A	Explorer - LEO	CE	462	9.9/2.6	297/297/285	462	9.9
25	KSC	Delta 300	LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5	982	21.4
			LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5		
26	KSC	THHD7/BII	LOG MOD	Logistic Module	LCE	26 300	28.0/14.0	270/270/55	26 300	28.0
27	WTR	THHB/C	NN/D-11	Earth Resources Sat - LEO	LCE	6 630	36.1/10.2	500/500/97	6 630	36.1

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1981 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
28	WTR	THIB/C	EO-8(1)	Earth Obs. Sat.	LCE	4 758	13.5/12.2	500/500/98	4 758	13.5
29	KSC	THIB/A	NN/D-16 C(2)	Com/Nav	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
30	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
31	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
32	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
33	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
34 _D	WTR									
35 _D	WTR									
36 _D	WTR									
37 _D	KSC									
38 _D	KSC									
39 _D	KSC									
40 _D	KSC									
41 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1981 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. ml./n. ml./deg)	Weight (lb)	Length (ft)
42 _D	WTR									
43 _D	WTR									
44 _D	WTR									
45 _D	WTR									
46 _D	WTR									
47 _D	WTR									
48 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1982										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
1	KSC	THHD/C	NN/D-9	Foreign Geosyn. Met. Sat.	CE	596	8.0/6.0	Syn. Eq.	2 040	29.9
			NN/D-4	Traffic Management	CE	703	12.0/7.2	Syn. Eq.		
			NN/D-5	Foreign Comsat.	CE	741	9.9/5.8	Syn. Eq.		
2	KSC	THHD/C	NN/D-2A	U.S. Dom Com Sat-A	LCE	1 057	11.1/7.6	Syn. Eq.	2 114	22.2
			NN/D-2A	U.S. Dom Com Sat-A	LCE	1 057	11.1/7.6	Syn. Eq.		
3	KSC	THHD/C	NN/D-3	Disaster Warning Sat.	LCE	1 949	11.3/8.0	Syn. Eq.	3 026	22.2
			NN/D-10	Geosyn Oper Met Sat	LCE	1 077	10.9/7.2	Syn. Eq.		
4	WTR	Delta 300	NN/D-8	Environ. Mon. Sat.	CE	1 414	13.0/8.0	920/920/103	1 414	13.0
5	WTR	Delta 300	EO-5D	Special Purpose Sat. Polar	LCE	675	9.7/4.7	400/400/90	675	9.7
6	KSC	THHD/BI	AST-6	LST	CE	20 639	36.3/12.0	340/340/28.5	20 639	36.3
7	WTR	Delta 900	EO-6	Tiros	LCE	1 920	12.3/10.0	790/790/102	1 920	12.3
8	WTR	THHC	EOP-4	Geopause	CE	2 231	10.0/6.5	16200/16200/90	2 231	10.0
9	KSC	THHC	NN/D-16B(1)	Astronomy	LCE	21 000	12.0/8.0	700/700/28.5	21 000	12.0
10	KSC	THHC	AST-10(2)	Infrared Astronomy	LCE	21 000	12.0/8.0	700/700/28.5	21 000	12.0
11	KSC	THHC	AST-11	Solar Physics - EOSO	LCE	19 000	12.0/8.0	550/550/28.5	19 000	12.0
12	KSC	THHD7	Phy-6	Cosmic X-Ray Experiment	LCE	22 000	20.0/8.0	200/200/55	22 000	20.0
13	KSC	THHD	AST-5	HEAO-D&E	CE	16 985	19.0/14.0	200/200/28.5	16 985	19.0
14	KSC	THHD	ST-1	Long Duration Exposure Facility	CE	10 200	37.0/14.0	270/270/28.5	10 200	37.0

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1982 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
15	WTR	Delta 904	EOP-3	SEASAT-B	LCE	3 030	18.3/14.7	325/325/90	3 030	18.3
16	WTR	THIB/C	EO-3B	EOS-B	LCE	6 630	36.0/10.2	494/494/99	6 630	36.0
17	WTR	THIB/C	NN/D-16A(1)	Earth Obs.	LCE	6 635	45.0/10.0	500/500/98	6 635	45.0
18	WTR	THIB/C	EOP-10(1)	EOPAP-Ocean Dynamics	LCE	4 758	13.5/12.3	450/450/90	4 758	13.5
19	KSC	THIB/A	Phy-1C	Explorer - High Altitude	CE	720	9.0/4.0	-	720	9.0
20	KSC	THIB/A	AST-3	Solar Physics Mission	LCE	4 281	13.1/11.6	270/270/30	4 281	13.1
21	KSC	THIB/A	C/N-4	Comm/Nav.	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
22	KSC	Delta 300	AST-1A	Explorer - LEO	CE	462	9.9/2.6	297/297/28.5	462	9.9
23	KSC	Delta 300	LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5	982	21.4
			LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5		
24	KSC	THID7/BI	LOG MOD	Logistic Module	LCE	26 300	28.0/14.0	270/270/55	26 300	28.0
25	WTR	THIB/C	NN/D-11	Earth Resources Sat - LEO	LCE	6 630	36.1/10.2	500/500/97	6 630	36.1
26	WTR	THIB/C	EO-8(1)	Earth Obs. Sat.	LCE	4 758	13.5/12.2	500/500/98	4 758	13.5
27	KSC	THIB/A	NN/D-16 C(2)	Com/Nav	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
28	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
29	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1982 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
30	KSC	TTHM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
31	KSC	TTHM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
32 _D	WTR									
33 _D	WTR									
34 _D	WTR									
35 _D	KSC									
36 _D	KSC									
37 _D	KSC									
38 _D	KSC									
39 _D	KSC									
40 _D	KSC									
41 _D	KSC									
42 _D	WTR									
43 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1982 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
44 _D	WTR									
45 _D	WTR									
46 _D	WTR									
47 _D	WTR									
48 _D	WTR									
49 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1983										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
1	KSC	THHD/C	NN/D-4	Traffic Management	CE	703	12.0/7.2	Syn. Eq.	4 691	21.8
			NN/D-1	INTEL SAT	CE	3 988	9.8/8.3	Syn. Eq.		
2	KSC	THHD/C	NN/D-1	INTEL SAT	CE	3 988	9.8/8.3	Syn. Eq.	5 404	29.4
			NN/D-5	Foreign Comsat	CE	741	9.9/5.8	Syn. Eq.		
			EO-5E	Special Purpose Sat - Syn.	LCE	675	9.7/4.7	Syn. Eq.		
3	KSC	THHD/C	NN/D-2A	U.S. Dom Com Sat-A	LCE	1 057	11.1/7.6	Syn. Eq.	6 225	24.9
			EO-4A	SEOS-R&D	LCE	5 168	13.8/12.9	Syn. Eq.		
4	KSC	THHD/C	NN/D-10	Geosyn Oper Met Sat	LCE	1 077	10.9/7.2	Syn. Eq.	1 077	10.9
5	KSC	Delta 304	AST-1B	Explorer-Syn.	CE	462	9.9/2.6	19323/19323/28.5	462	9.9
6	KSC	THHB/C/BII	PL-10	Innerplanetary Follow-on	CE	1 857	9.0/9.0	-	1 857	9.0
7	WTR	Delta 900	Phy-2A	Gravity/Relativity Sat.-A	LCE	2 514	13.6/12.5	500/500/90	2 514	13.6
8	WTR	THHC	AST-10(1)	Infrared Astr.	LCE	21 000	12.0/8.0	700/700/90	21 000	12.0
9	KSC	THHC	NN/D-16D(1)	Solar Physics	LCE	19 000	12.0/8.0	550/550/28.5	19 000	12.0
10	KSC	THHD	AST-9A	Focusing X-Ray Telescope-A	CE	16 985	19.0/14.0	270/270/28.5	16 985	19.0
11	KSC	THHD	Phy-7(2B)	Particle Inject. Experiment	LCE	20 000	15.0/8.0	200/200/55	20 000	15.0
12	WTR	THHB/C	EO-3A	EOS-A	LCE	6 630	36.0/10.2	494/494/99	6 630	36.0
13	KSC	THHB/A	Phy-1C	Explorer High Altitude	CE	720	9.0/4.0	-	720	9.0

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1983 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
14	KSC	THIB/A	NN/D-2C	TDRS	CE	744	15.5/6.3	Syn. Eq.	744	15.5
15	KSC	THIB/A	NN/D-2C	TDRS	CE	744	15.5/6.3	Syn. Eq.	744	15.5
16	KSC	THIB/A	NN/D-2C	TDRS	CE	744	15.5/6.3	Syn. Eq.	744	15.5
17	KSC	THIB/A	EOP-10(2)	EOPAP-Earth Dynamics	LCE	4 758	13.5/12.3	450/450/28.5	4 758	13.5
18	KSC	THIB/A	NN/D-16B(6)	Astronomy	LCE	4 075	13.0/11.3	200/200/28.5	4 075	13.0
19	KSC	THID/C	PL-11	Venus Radar Mapper	CE	8 972	28.5/15.0	-	8 972	28.5
20	KSC	THID/C	PL-11	Venus Radar Mapper	CE	8 972	28.5/15.0	-	8 972	28.5
21	KSC	Delta 300	AST-1A	Explorer - LEO	CE	462	9.9/2.6	297/297/28.5	462	9.9
22	KSC	Delta 300	LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5	982	21.4
			LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5		
23	KSC	THID7/BI	LOG MOD	Logistic Module	LCE	26 300	28.0/14.0	270/270/55	26 300	28.0
24	WTR	THIB/C	NN/D-11	Earth Resources Sat - LEO	LCE	6 630	36.1/10.2	500/500/97	6 630	36.1
25	WTR	THIB/C	EO-8(1)	Earth Obs. Sat.	LCE	4 758	13.5/12.2	500/500/98	4 758	13.5
26	WTR	THIB/A	AST-10(6)	Explorer	LCE	4 075	13.0/11.3	200/200/90	4 075	13.0
27	KSC	THIB/A	NN/D-16 C(2)	Com/Nav	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
28	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1983 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
29	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
30	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
31	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
32 _D	WTR									
33 _D	WTR									
34 _D	WTR									
35 _D	WTR									
36 _D	WTR									
37 _D	WTR									
38 _D	WTR									
39 _D	KSC									
40 _D	KSC									
41 _D	KSC									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1983 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
42 _D	KSC									
43 _D	KSC									
44 _D	KSC									
45 _D	KSC									
46 _D	KSC									
47 _D	WTR									
48 _D	WTR									
49 _D	WTR									
50 _D	WTR									
51 _D	WTR									
52 _D	WTR									
53 _D	WTR									
54 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1984										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
1	KSC	THHD/C	NN/D-9	Foreign Geosyn Met Sat	CE	596	8.0/6.0	Syn. Eq.	5 287	29.8
			NN/D-4	Traffic Management	CE	703	12.0/7.2	Syn. Eq.		
			NN/D-1	INTEL SAT	CE	3 988	9.8/8.3	Syn. Eq.		
2	KSC	THHD/C	NN/D-1	INTEL SAT	CE	3 988	9.8/8.3	Syn. Eq.	4 729	19.7
			NN/D-5	Foreign Comsat	CE	741	9.9/5.8	Syn. Eq.		
3	KSC	THHD/C	NN/D-1	INTEL SAT	CE	3 988	9.8/8.3	Syn. Eq.	3 988	19.7
4	KSC	THHD/C	NN/D-2B	U.S. Dom Com Sat-B	CE	3 988	9.8/8.3	Syn. Eq.	3 988	19.7
5	WTR	Delta 300	Phy-1A	Explorer - Upper Atmosphere	CE	1 240	11.0/4.0	1900/140/90	1 240	11.0
6	WTR	Delta 300	EO-5C	Special Purpose Sat. Polar	LCE	675	9.7/4.7	280/280/90	675	9.7
7	KSC	Delta 304	Phy-1B	Explorer - Medium Altitude	CE	641	10.5/5.0	20000/1000/28.5	641	10.5
8	KSC	THHD/BII	AST-6	LST	CE	20 639	36.3/12.0	340/340/28.5	20 639	36.3
9	KSC	THHD7/C	PL-7	Mars Surface Sample Return	LCE	10 639	23.5/14.7	-	10 639	23.5
10	KSC	THHD7/C	PL-7	Mars Surface Sample Return	LCE	10 639	23.5/14.7	-	10 639	23.5
11	KSC	THHD7/C/BII	PL-20	Pioneer Jupiter Probe	LCE	1 963	11.8/8.8	-	1 963	11.8
12	KSC	THHD7/C/BII	PL-20	Pioneer Jupiter Probe	LCE	1 963	11.8/8.8	-	1 963	11.8
13	KSC	THHC	Phy-3A	Environ. Pert. Sat-A	LCE	5 522	14.0/13.3	6900/6900/55	5 522	14.0
14	KSC	THHC	AST-10(3)	Ultraviolet Astr.	LCE	13 000	8.0/6.0	700/700/28.5	13 000	8.0

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1984 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. ml./deg)	Weight (lb)	Length (ft)
15	KSC	THHC	NN/D-16B(3)	Astronomy	LCE	13 000	8.0/6.0	700/700/28.5	13 000	8.0
16	KSC	THHC	AST-11	Solar Physics - EOSO	LCE	19 000	12.0/8.0	550/550/28.5	19 000	12.0
17	KSC	THHD7	Phy-6	Cosmic X-Ray Experiment	LCE	22 000	20.0/8.0	200/200/55	22 000	20.0
18	KSC	THHD	AST-5	HEAO-D&E	CE	16 985	19.0/14.0	200/200/28.5	16 985	19.0
19	KSC	THHD	ST-1	Long Duration Exposure Facility	CE	10 200	37.0/14.0	270/270/28.5	10 200	37.0
20	KSC	THHD	Phy-7(1B)	MHD Experiment	LCE	20 000	12.0/8.0	200/200/55	20 000	12.0
21	KSC	THHB/C	LUN-2	Automated Lunar Orbiter	LCE	2 475	11.2/7.8	-	2 475	11.2
22	WTR	THHB/C	EO-3C	EOS-C	LCE	6 630	36.0/10.2	494/494/99	6 630	36.0
23	WTR	THHB/C	NN/D-16A(1)	Earth Obs.	LCE	6 635	45.0/10.0	500/500/98	6 635	45.0
24	WTR	THHB/C	EOP-10(1)	EOPAP-Ocean Dynamics	LCE	4 758	13.5/12.3	450/450/90	4 758	13.5
25	KSC	THHB/A	AST-3	Solar Physics Mission	LCE	4 281	13.1/11.6	270/270/30	4 281	13.1
26	KSC	THHB/A	AST-10(4)	U V Astr. Survey	LCE	4 075	13.0/11.3	700/700/28.5	4 075	13.0
27	KSC	THHB/A	C/N-4	Comm/Nav.	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
28	KSC	Delta 300	AST-1A	Explorer - LEO	CE	462	9.9/2.6	297/297/285	462	9.9
29	KSC	Delta 300	LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5	982	21.4
			LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5		

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1984 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
30	KSC	THID7/BII	LOG MOD	Logistic Module	LCE	26 300	28.0/14.0	270/270/55	26 300	28.0
31	WTR	THIB/C	NN/D-11	Earth Resources Sat - LEO	LCE	6 630	36.1/10.2	500/500/97	6 630	36.1
32	WTR	THIB/C	EO-8(1)	Earth Obs. Sat.	LCE	4 758	13.5/12.2	500/500/98	4 758	13.5
33	KSC	THIB/A	AST-10(6)	Explorer	LCE	4 075	13.0/11.3	200/200/28.5	4 075	13.0
34	KSC	THIB/A	NN/D-16 C(2)	Com/Nav	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
35	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
36	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
37	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
38	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
39 _D	WTR									
40 _D	WTR									
41 _D	KSC									
42 _D	KSC									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1984 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
43 _D	KSC									
44 _D	KSC									
45 _D	KSC									
46 _D	KSC									
47 _D	KSC									
48 _D	KSC									
49 _D	KSC									
50 _D	KSC									
51 _D	KSC									
52 _D	WTR									
53 _D	WTR									
54 _D	WTR									
55 _D	WTR									
56 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1984 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit H/A/H/P/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
57 _D	WTR									
58 _D	WTR									
59 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1985										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
1	KSC	TIHD/C	NN/D-1	INTEL SAT	CE	3 988	9.8/8.3	Syn. Eq.	4 729	19.7
			NN/D-5	Foreign Comsat	CE	741	9.9/5.8	Syn. Eq.		
2	KSC	TIHD/C	NN/D-1	INTEL SAT	CE	3 988	9.8/8.3	Syn. Eq.	5 937	21.1
			NN/D-3	Disaster Warning Sat.	LCE	1 949	11.3/8.0	Syn. Eq.		
3	KSC	TIHD/C	NN/D-2B	U.S. Dom Com Sat-B	CE	3 988	9.8/8.3	Syn. Eq.	5 065	20.7
			NN/D-10	Geosyn Oper Met Sat	LCE	1 077	10.9/7.2	Syn. Eq.		
4	KSC	TIHD/C	NN/D-6	Communications R&D Sat.	LCE	3 871	13.1/11.6	Syn. Eq.	3 871	13.1
5	KSC	TIHD/C	EO-4A	SEOS-R&D	LCE	5 168	13.8/12.9	Syn. Eq.	5 168	13.8
6	WTR	Delta 300	NN/D-8	Environ. Mon. Sat.	CE	1 414	13.0/8.0	920/920/103	1 414	13.0
7	WTR	Delta 300	EO-5D	Special Sat-Polar	LCE	675	9.7/4.7	400/400/90	675	9.7
8	WTR	Scout	EOP-6C	Mini Lageos	CE	225	1.6/1.6	350/350/90	225	1.6
9	WTR	Scout	EOP-6C	Mini Lageos	CE	225	1.6/1.6	350/350/90	225	1.6
10	KSC	Scout	EOP-6A	Mini Lageos	CE	225	1.6/1.6	350/350/28.5	225	1.6
11	KSC	Scout	EOP-6A	Mini Lageos	CE	225	1.6/1.6	350/350/28.5	225	1.6
12	KSC	Scout	EOP-6B	Mini Lageos	CE	225	1.6/1.6	350/350/55	225	1.6
13	KSC	Scout	EOP-6B	Mini Lageos	CE	225	1.6/1.6	350/350/55	225	1.6
14	KSC	Delta 304	AST-1B	Explorer - Syn	CE	462	9.9/2.6	19323/19323/28.5	462	9.9

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1985 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
15	KSC	THIB/C/BI	PL-27	Halley Flyby	LCE	2 073	13.5/12.2	-	2 073	13.5
16	KSC	THID7/C/BI	PL-12	Venus Buoyant Station	CE	13 798	14.0/15.0	-	13 798	14.0
17	KSC	THID7/C/BI	PL-12	Venus Buoyant Station	CE	13 798	14.0/15.0	-	13 798	14.0
18	KSC	THID7/C/BI	PL-21	Mariner Saturn Orbiter	CE	4 272	28.7/15.0	-	4 272	28.7
19	KSC	THID7/C/BI	PL-21	Mariner Saturn Orbiter	CE	4 272	28.7/15.0	-	4 272	28.7
20	KSC	THIC	AST-8	LRO	CE	2 432	25.5/10.0	38646/38646/28.5	2 432	25.5
21	WTR	THIC	AST-10(1)	Infrared Astr.	LCE	21 000	12.0/8.0	700/700/90	21 000	12.0
22	KSC	THIC	NN/D-16B(2)	Astronomy	LCE	21 000	12.0/8.0	700/700/28.5	21 000	12.0
23	KSC	THID7	AST-9B	Focusing X-Ray Telescope-B	CE	23 535	54.5/14.0	270/270/28.5	23 535	54.5
24	WTR	THID7	Phy-7(3c)	Atmospheric Science	LCE	20 000	15.0/8.0	200/200/90	20 000	15.0
25	WTR	THID7	NN/D-16C(1)	Atmospheric and Space Physics	LCE	20 000	15.0/8.0	200/200/90	20 000	15.0
26	KSC	THID7	AST-7	LSO	CE	24 147	60.0/15.0	190/190/28.5	24 147	60.0
27	KSC	THID	Phy-7(2A)	Particle Inject Experiment	LCE	20 000	15.0/8.0	200/200/28.5	20 000	15.0
28	KSC	Delta 904	Phy-7(5)	Chemical Release	LCE	2 405	10.9/9.0	Suborbit/28.5	2 405	10.9
29	KSC	Delta 904	Phy-7(5)	Chemical Release	LCE	2 405	10.9/9.0	Suborbit/28.5	2 405	10.9
30	WTR	THIB/C	EO-3B	EOS-B	LCE	6 630	36.0/10.2	494/494/99	6 630	36.0

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1985 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
31	KSC	THHB/A	Phy-1C	Explorer-High Altitude	CE	720	9.0/4.0	-	720	9.0
32	KSC	THHB/A	EOP-10(2)	EOPAP-Earth Dynamics	LCE	4 758	13.5/12.3	450/450/28.5	4 758	13.5
33	KSC	Delta 300	AST-1A	Explorer-LEO	CE	462	9.9/2.6	297/297/28.5	462	9.9
34	KSC	Delta 300	LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5	982	21.4
			LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5		
35	KSC	THHD7/BII	LOG MOD	Logistic Module	LCE	26 300	28.0/14.0	270/270/55	26 300	28.0
36	WTR	THHB/C	NN/D-11	Earth Resources Sat-LEO	LCE	6 630	36.1/10.2	500/500/97	6 630	36.1
37	WTR	THHB/C	EO-8(1)	Earth Obs. Sat.	LCE	4 758	13.5/12.2	500/500/98	4 758	13.5
38	WTR	THHB/A	AST-10(6)	Explorer	LCE	4 075	13.0/11.3	200/200/90	4 075	13.0
39	KSC	THHB/A	NN/D-16 C(2)	Com/Nav	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.0
40	KSC	THHM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
41	KSC	THHM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
42	KSC	THHM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
43	KSC	THHM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
44 _D	WTR									
45 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1985 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
46 _D	WTR									
47 _D	WTR									
48 _D	WTR									
49 _D	WTR									
50 _D	WTR									
51 _D	WTR									
52 _D	KSC									
53 _D	KSC									
54 _D	KSC									
55 _D	KSC									
56 _D	KSC									
57 _D	WTR									
58 _D	WTR									
59 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1985 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
60 _D	WTR									
61 _D	WTR									
62 _D	WTR									
63 _D	WTR									
64 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1986										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
1	KSC	THID/C	NN/D-9	Foreign Geosyn. Met. Sat.	CE	596	8.0/6.0	Syn. Eq.	5 287	29.8
			NN/D-4	Traffic Management	CE	703	12.0/7.2	Syn. Eq.		
			NN/D-1	Intelsat	CE	3 988	9.8/8.3	Syn. Eq.		
2	KSC	THID/C	NN/D-1	Intelsat	CE	3 988	9.8/8.3	Syn. Eq.	5 404	29.4
			NN/D-5	Foreign Com. Sat.	CE	741	9.9/5.8	Syn. Eq.		
			EO-5E	Special Purpose Sat. Syn.	LCE	675	9.7/4.7	Syn. Eq.		
3	KSC	THID/C	NN/D-2B	U.S. Dom. Com. Sat.-B	CE	3 988	9.8/8.3	Syn. Eq.	3 988	9.8
4	KSC	THID/C	NN/D-2B	U.S. Dom. Com. Sat.-B	CE	3 988	9.8/8.3	Syn. Eq.	3 988	9.8
5	KSC	Delta 300	EOP-9	Magnetic Mon. Sat.	LCE	847	10.1/5.6	1 080/540/28	847	10.1
6	WTR	Delta 300	NN/D-8	Environ. Mon. Sat.	CE	1 414	13.0/8.0	920/920/103	1 414	13.0
7	WTR	Delta 300	EOP-8	Vector Magnetometer Sat.	LCE	1 101	10.4/6.0	216/216/90	2 202	20.8
			EOP-8	Vector Magnetometer Sat.	LCE	1 101	10.4/6.0	216/216/90		
8	WTR	Delta 300	EOP-8	Vector Magnetometer Sat.	LCE	1 101	10.4/6.0	216/216/90	1 101	10.4
9	KSC	THID/BII	AST-6	LST	CE	20 639	36.3/12.0	340/340/28.5	20 639	36.3
10	KSC	THIB/C/BII	PL-10	Innerplanetary Follow-on	CE	1 857	9.0/9.0	-	1 857	9.0
11	KSC	THID7/C/BII	PL-22	Mariner Uranus Probe/Neptune Fly-by	CE	2 266	25.5/15.0	-	2 266	25.5
12	KSC	THID7/C/BII	PL-22	Mariner Uranus Probe/Neptune Fly-by	CE	2 266	25.5/15.0	-	2 266	25.5

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1986 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
13	KSC	THHD7/BII	LS-2	Life Science Module	LCE	25 700	30.0/14.0	270/270/55	25 700	30.0
14	KSC	THHC	AST-10(2)	Infrared Astr.	LCE	21 000	12.0/8.0	700/700/28.5	21 000	12.0
15	KSC	THHC	AST-10(3)	Ultraviolet Astr.	LCE	13 000	8.0/6.0	700/700/28.5	13 000	8.0
16	KSC	THHC	AST-11	Solar Physics-EOSO	LCE	19 000	12.0/8.0	550/550/28.5	19 000	12.0
17	KSC	THHD-7	ST-2	Advanced Technology Module	LCE	19 300	32.0/14.0	270/270/55	19 300	32.0
18	KSC	THHD-7	SP-1/NN/D-15	Space Processing Module	LCE	17 400	30.0/14.0	270/270/55	17 400	30.0
19	KSC	THHD-7	Phy-6	Cosmic X-Ray Experiment	LCE	22 000	20.0/8.0	200/200/55	22 000	20.0
20	KSC	THHD-7	NN/D-16D (2)	High Energy	LCE	22 000	20.0/8.0	200/200/55	22 000	20.0
21	KSC	THHD	AST-5	HEAO - D & E	CE	16 985	19.0/14.0	200/200/28.5	16 985	19.0
22	KSC	THHD	ST-1	Long Duration Exposure Facility	CE	10 200	37.0/14.0	270/270/28.5	10 200	37.0
23	KSC	THHB/C	LUN-2	Automated Lunar Orbiter	LCE	2 475	11.2/7.8	-	2 475	11.2
24	WTR	THHB/C	EO-3A	EOS-A	LCE	6 630	36.0/10.2	494/494/99	6 630	36.0
25	WTR	THHB/C	NN/D-16A (1)	Earth Obs.	LCE	6 635	45.0/10.0	500/500/98	6 635	45.0

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1986 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
26	WTR	THIB/C	EOP-10(1)	EOPAP - Ocean Dynamics	LCE	4 758	13.5/12.3	450/450/90	4 758	13.5
27	WTR	THIB/A	NN/D-14	Global E & O Mon. System	LCE	4 908	13.6/12.5	200/200/98	4 908	13.6
28	WTR	THIB/A	NN/D-14	Global E & O Mon. System	LCE	4 908	13.6/12.5	200/200/98	4 908	13.6
29	WTR	THIB/A	NN/D-14	Global E & O Mon. System	LCE	4 908	13.6/12.5	200/200/98	4 908	13.6
30	KSC	THIB/A	Phy-1C	Explorer - High Altitude	CE	720	9.0/4.0	-	720	9.0
31	KSC	THIB/A	AST-3	Solar Physics Mission	LCE	4 281	13.1/11.6	270/270/30	4 281	13.1
32	KSC	THIB/A	NN/D-16B (6)	Astronomy	LCE	4 075	13.0/11.3	200/200/28.5	4 075	13.0
33	KSC	THIB/A	C/N-4	Comm/Nav.	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
34	KSC	THID/C	Phy-2B	Gravity/Relativity Sat. -B	LCE	1 372	12.0/9.0	-	1 372	12.0
35	KSC	THID/C	PL-28	Asteroid Rend.	LCE	18 754	19.3/14.7	-	18 754	19.3
36	KSC	THID/C	PL-28	Asteroid Rend.	LCE	18 754	19.3/14.7	-	18 754	19.3
37	KSC	Delta 300	AST-1A	Explorer - LEO	CE	462	9.9/2.6	297/297/28.5	462	9.9
38	KSC	Delta 300	LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5	982	21.4
			LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5		

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1986 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
39	KSC	THID-7/BII	LOG-MOD	Logistic Module	LCE	26 300	28.0/14.0	270/270/55	26 300	28.0
40	WTR	THIB/C	NN/D-11	Earth Resources Sat.-LEO	LCE	6 630	36.1/10.2	500/500/97	6 630	36.1
41	WTR	THIB/C	EO-8(1)	Earth Obs. Sat.	LCE	4 758	13.5/12.2	500/500/98	4 758	13.5
42	KSC	THIB/A	Ast-10(6)	Explorer	LCE	4 075	13.0/11.3	200/200/28.5	4 075	13.0
43	KSC	THIB/A	NN/D-16 C(2)	Com/Nav.	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
44	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
45	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
46	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
47	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
48 _D	WTR									
49 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1986 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
50 _D	WTR									
51 _D	KSC									
52 _D	KSC									
53 _D	KSC									
54 _D	KSC									
55 _D	KSC									
56 _D	KSC									
57 _D	WTR									
58 _D	WTR									
59 _D	WTR									
60 _D	WTR									
61 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1986 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
62 _D	WTR									
63 _D	WTR									
64 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1987										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
1	KSC	THHD/C	NN/D-2B	U.S. Dom. Com. Sat.-B	CE	3 988	9.8/8.3	Syn. Eq.	4 729	19.7
			NN/D-5	Foreign Comsat.	CE	741	9.9/5.8	Syn. Eq.		
2	KSC	THHD/C	NN/D-2B	U.S. Dom. Com. Sat.-B	CE	3 988	9.8/8.3	Syn. Eq.	5 065	20.7
			EO-7	Syn. Met. Sat.	LCE	1 077	10.9/7.2	Syn. Eq.		
3	KSC	THHD/C	EO-4B	SEOS Oper.	LCE	5 168	13.8/12.9	Syn. Eq.	6 245	24.7
			NN/D-10	Geosyn. Oper. Met. Sat.	LCE	1 077	10.9/7.2	Syn. Eq.		
4	KSC	THHD/C	EO-4B	SEOS Oper.	LCE	5 168	13.8/12.9	Syn. Eq.	5 168	13.8
5	WTR	Delta 300	NN/D-8	Environ. Mon. Sat.	CE	1 414	13.0/8.0	920/920/103	1 414	13.0
6	WTR	Delta 300	EO-5C	Special Purpose Sat. Polar	LCE	675	9.7/4.7	280/280/90	675	9.7
7	KSC	Delta 304	Ast-1B	Explorer - Syn.	CE	462	9.9/2.6	19323/19323/28.5	462	9.9
8	KSC	THHD-7/C	Phy-5	Cosmic Ray Lab.	CE	46 757	45.0/14.0	200/200/28.5	46 757	45.0
9	WTR	Delta 900	EO-6	Tiros	LCE	1 920	12.3/10.0	790/790/102	1 920	12.3
10	KSC	THHC	Ast-8	LRO	CE	2 432	25.5/10.0	38646/38646/28.5	2 432	25.5
11	WTR	THHC	Ast-10(1)	Infrared Astr.	LCE	21 000	12.0/8.0	700/700/90	21 000	12.0
12	WTR	THHD-7	Phy-7(4)	Auroral Observatory	LCE	20 000	15.0/8.0	200/200/90	20 000	15.0

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1987 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
13	WTR	THHD-7	Phy-7(2C)	Particle Inject.	LCE	20 000	15.0/8.0	200/200/90	20 000	15.0
14	KSC	THHD-7	Ast-7	LSO	CE	24 147	60.0/15.0	190/190/28.5	24 147	60.0
15	KSC	THHD	Ast-9A	Focusing X-Ray Telescope-A	CE	16 985	19.0/14.0	270/270/28.5	16 985	19.0
16	KSC	Delta 904	Phy-7(5)	Chemical Release	LCE	2 405	10.9/9.0	Sub-orbital/28.5	2 405	10.9
17	KSC	Delta 904	Phy-7(5)	Chemical Release	LCE	2 405	10.9/9.0	Sub-orbital/28.5	2 405	10.9
18	WTR	THHB/C	EO-3C	EOS-C	LCE	6 630	36.0/10.2	494/494/99	6 630	36.0
19	KSC	THHB/A	Phy-1C	Explorer - High Altitude	CE	720	9.0/4.0	-	720	9.0
20	KSC	THHB/A	EOP-10(2)	EOPAP - Earth Dynamics	LCE	4 758	13.5/12.3	405/450/28.5	4 758	13.5
21	KSC	THHB/A	Ast-10(5)	X-Ray & UV Astr.	LCE	4 075	13.0/11.3	700/700/28.5	4 075	13.0
22	KSC	THHB/A	NN/D-16B (4)	Astronomy	LCE	4 075	13.0/11.3	700/700/28.5	4 075	13.0
23	KSC	THHD/C	Phy-3B	Environ. Pert. Sat.-B	CE	8 874	15.5/10.0	6900/6900/55	8 874	15.5
24	KSC	THHD/C	PL-13	Mercury Orbiter	CE	8 420	28.7/15.0	-	8 420	28.7
25	KSC	THHD/C	PL-13	Mercury Orbiter	CE	8 420	28.7/15.0	-	8 420	28.7
26	KSC	THHD/C	LUN-3	Automated Lunar Rover	CE	8 700	24.0/10.0	-	8 700	24.0
27	KSC	Delta 300	Ast-1A	Explorer - LEO	CE	462	9.9/2.6	297/297/28.5	462	9.9

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1987 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
28	KSC	Delta 300	LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5	982	21.4
			LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5		
29	KSC	THUD-7/BU	LOG-MOD	Logistic Module	LCE	26 300	28.0/14.0	270/270/55	26 300	28.0
30	WTR	THIB/C	NN/D-11	Earth Resources Sat. - LEO	LCE	6 630	36.1/10.2	500/500/97	6 630	36.1
31	WTR	THIB/C	EQ-8(1)	Earth Obs. Sat.	LCE	4 758	13.5/12.2	500/500/98	4 758	13.5
32	WTR	THIB/A	AST-10(6)	Explorer	LCE	4 075	13.0/11.3	200/200/90	4 075	13.0
33	KSC	THIB/A	NN/D-16 C(2)	Com/Nav	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
34	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
35	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
36	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
37	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
38 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1987 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi. /n. mi. /deg)	Weight (lb)	Length (ft)
39 _D	WTR									
40 _D	WTR									
41 _D	WTR									
42 _D	KSC									
43 _D	KSC									
44 _D	KSC									
45 _D	KSC									
46 _D	KSC									
47 _D	KSC									
48 _D	KSC									
49 _D	KSC									
50 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1987 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
51 _D	WTR									
52 _D	WTR									
53 _D	WTR									
54 _D	WTR									
55 _D	WTR									
56 _D	WTR									
57 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1988										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
1	KSC	THHD/C	NN/D-9	Foreign Geosyn Met. Sat.	CE	596	8.0/6.0	Syn. Eq.	3 967	28.7
			NN/D-4	Traffic Management	CE	703	12.0/7.2	Syn. Eq.		
			NN/D-13	Foreign SEOS	CE	2 668	8.7/7.4	Syn. Eq.		
2	KSC	THHD/C	NN/D-12	Earth Resources - Syn.	CE	2 668	8.7/7.4	Syn. Eq.	6 077	27.3
			NN/D-12	Earth Resources - Syn.	CE	2 668	8.7/7.4	Syn. Eq.		
			NN/D-5	Foreign Comsat.	CE	741	9.9/5.8	Syn. Eq.		
3	KSC	THHD/C	NN/D-2B	U.S. Dom. Com. Sat.-B	CE	3 988	9.8/8.3	Syn. Eq.	5 065	20.7
			NN/D-10	Geosyn. Oper. Met. Sat.	LCE	1 077	10.9/7.2	Syn. Eq.		
4	KSC	THHD/C	NN/D-2B	U.S. Dom. Com. Sat.-B	CE	3 988	9.8/8.3	Syn. Eq.	3 988	9.8
5	KSC	THHD/C	NN/D-2B	U.S. Dom. Com. Sat.-B	CE	3 988	9.8/8.3	Syn. Eq.	3 988	9.8
6	KSC	THHD/C	NN/D-6	Communications R & D Sat.	LCE	3 871	13.1/11.6	Syn. Eq.	3 871	13.1
7	WTR	Delta 300	NN/D-8	Environ. Mon. Sat.	CE	1 414	13.0/8.0	920/920/103	1 414	13.0
8	WTR	Delta 300	EO-5D	Special Purpose Sat. Polar	LCE	675	9.7/4.7	400/400/90	675	9.7
9	WTR	Delta 300	Phy-1A	Explorer - Upper Atmosphere	CE	1 240	11.0/4.0	1900/140/90	1 240	11.0
10	KSC	Delta 304	Phy-1B	Explorer - Medium Alt.	CE	641	10.5/5.0	20000/1000/28.5	641	10.5
11	KSC	THHD/BI	Ast-6	LST	CE	20 639	36.3/12.0	340/340/28.5	20 639	36.3
12	KSC	THHD-7/C/BI	Phy-4	Heliocentric & Interstellar S/C	LCE	931	12.9/11.1	-	931	12.9

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1988 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HIP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
13	KSC	THHC	NN/D-16B (1)	Astronomy	LCE	21 000	12.0/8.0	700/700/28.5	21 000	12.0
14	KSC	THHC	Ast-10(3)	Ultraviolet Astr.	LCE	13 000	8.0/6.0	700/700/28.5	13 000	8.0
15	KSC	THHC	Ast-11	Solar Physics - EOSO	LCE	19 000	12.0/8.0	550/550/28.5	19 000	12.0
16	WTR	THHD-7	Phy-7(1C)	MHD Experiment	LCE	20 000	12.0/8.0	200/200/90	20 000	12.0
17	KSC	THHD	Ast-5	HEAO - D & E	CE	16 985	19.0/14.0	200/200/28.5	16 985	19.0
18	KSC	THHD	ST-1	Long Duration Exposure Module	CE	10 200	37.0/14.0	270/270/28.5	10 200	37.0
19	WTR	THHB/C	EO-3B	EOS - B	LCE	6 630	36.0/10.2	494/494/99	6 630	36.0
20	WTR	THHB/C	NN/D-16A (1)	Earth Obs.	LCE	6 635	45.0/10.0	500/500/98	6 635	45.0
21	WTR	THHB/C	EOP-10(1)	EOPAP - Ocean Dynamics	LCE	4 758	13.5/12.3	450/450/90	4 758	13.5
22	WTR	THHB/A	NN/D-14	Global E & O Mon. System	LCE	4 908	13.6/12.5	200/200/98	4 908	13.6
23	WTR	THHB/A	NN/D-14	Global E & O Mon. System	LCE	4 908	13.6/12.5	200/200/98	4 908	13.6
24	WTR	THHB/A	NN/D-14	Global E & O Mon. System	LCE	4 908	13.6/12.5	200/200/98	4 908	13.6
25	KSC	THHB/A	Ast-3	Solar Physics Mission	LCE	4 281	13.1/11.6	270/270/30	4 281	13.1
26	KSC	THHB/A	NN/D-2C	TDRS	CE	744	15.5/6.3	Syn. Eq.	744	15.5

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1988 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
27	KSC	THIB/A	NN/D-2C	TDRS	CE	744	15.5/6.3	Syn. Eq.	744	15.5
28	KSC	THIB/A	NN/D-2C	TDRS	CE	744	15.5/6.3	Syn. Eq.	744	15.5
29	KSC	THIB/A	C/N-4	Comm./Nav.	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
30	KSC	THID/C	LUN-3	Automated Lunar Rover	CE	8 700	24.0/10.0	-	8 700	24.0
31	KSC	Delta 300	Ast-1A	Explorer - LEO	CE	462	9.9/2.6	297/297/28.5	462	9.9
32	KSC	Delta 300	LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5	982	21.4
			LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5		
33	KSC	THID-7/BI	LOG-MOD	Logistic Module	LCE	26 300	28.0/14.0	270/270/55	26 300	28.0
34	WTR	THIB/C	NN/D-11	Earth Resources Sat. - LEO	LCE	6 630	36.1/10.2	500/500/97	6 630	36.1
35	WTR	THIB/C	EO-8(1)	Earth Obs. Sat.	LCE	4 758	13.5/12.2	500/500/98	4 758	13.5
36	KSC	THIB/A	Ast-10(6)	Explorer	LCE	4 075	13.0/11.3	200/200/28.5	4 075	13.0
37	KSC	THIB/A	NN/D-16 C(2)	Com./Nav.	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
38	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
39	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1988 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
40	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
41	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
42 _D	WTR									
43 _D	WTR									
44 _D	WTR									
45 _D	KSC									
46 _D	KSC									
47 _D	KSC									
48 _D	KSC									
49 _D	KSC									
50 _D	KSC									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1988 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
51 _D	KSC									
52 _D	KSC									
53 _D	WTR									
54 _D	WTR									
55 _D	WTR									
56 _D	WTR									
57 _D	WTR									
58 _D	WTR									
59 _D	WTR									
60 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1989										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi. /n. mi. /deg)	Weight (lb)	Length (ft)
1	KSC	THHD/C	NN/D-1	Intelsat	CE	3 988	9.8/8.3	Syn. Eq.	7 397	28.4
			NN/D-13	Foreign SEOS	CE	2 668	8.7/7.4	Syn. Eq.		
			NN/D-5	Foreign Comsat	CE	741	9.9/5.8	Syn. Eq.		
2	KSC	THHD/C	NN/D-1	Intelsat	CE	3 988	9.8/8.3	Syn. Eq.	7 331	28.2
			NN/D-13	Foreign SEOS	CE	2 668	8.7/7.4	Syn. Eq.		
			EO-5E	Special Purpose Sat.	LCE	675	9.7/4.7	Syn. Eq.		
3	KSC	THHD/C	NN/D-2B	U.S. Dom. Com. Sat.-B	CE	3 988	9.8/8.3	Syn. Eq.	5 065	20.7
			NN/D-10	Geosyn. Oper Met. Sat.	LCE	1 077	10.9/7.2	Syn. Eq.		
4	KSC	THHD/C	NN/D-2B	U.S. Dom. Com. Sat-B	CE	3 988	9.8/8.3	Syn. Eq.	3 988	9.8
5	KSC	THHD/C	EO-4B	SEOS-Oper.	LCE	5 168	13.8/12.9	Syn. Eq.	5 168	13.8
6	KSC	THHD/C	EO-4B	SEOS-Oper.	LCE	5 168	13.8/12.9	Syn. Eq.	5 168	13.8
7	WTR	Delta 300	Phy-1A	Explorer-Upper Atmosphere	CE	1 240	11.0/4.0	1900/140/90	1 240	11.0
8	KSC	Delta 304	Phy-1B	Explorer-Medium Altitude	CE	641	10.5/5.0	20000/1000/28.5	641	10.5
9	KSC	THHD7/C	Phy-5	Cosmic Ray Lab	CE	46 757	45.0/14.0	200/200/28.5	46 757	45.0
10	KSC	THHC	AST-8	LRO	CE	2 432	25.5/10.0	38646/38646/28.5	2 432	25.5
11	KSC	THHC	LUN-4	Halo Sat.	LCE	4 633	19.1/14.7	-	4 633	19.1
12	WTR	THHC	AST-10(1)	Infrared Astr.	LCE	21 000	12.0/8.0	700/700/90	21 000	12.0
13	KSC	THHD7	AST-9B	Focusing X-Ray Telescope-B	CE	23 535	54.5/14.0	270/270/28.5	23 535	54.5

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1989 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
14	KSC	THHD7	Phy-6	Cosmic X-Ray Experiment	LCE	22 000	20.0/8.0	200/200/55	22 000	20.0
15	KSC	THHD7	AST-7	LSO	CE	24 147	60.0/15.0	190/190/28.5	24 147	60.0
16	WTR	THHB/C	EO-3A	EOS-A	LCE	6 630	36.0/10.2	494/494/99	6 630	36.0
17	KSC	THHB/A	EOP-10(2)	EOPAP-Earth Dynamics	LCE	4 758	13.5/12.3	450/450/28.5	4 758	13.5
18	KSC	THHB/A	NN/D-16B(6)	Astronomy	LCE	4 075	13.0/11.3	200/200/28.5	4 075	13.0
19	KSC	THHB/A	AST-10(5)	X-Ray and UV Astr.	LCE	4 075	13.0/11.3	700/700/28.5	4 075	13.0
20	KSC	THHD/C	PL-14	Venus Large Lander	LCE	6 128	27.8/14.7	-	6 128	27.8
21	KSC	THHD/C	PL-14	Venus Large Lander	LCE	6 128	27.8/14.7	-	6 128	27.8
22	KSC	Delta 300	AST-1A	Explorer - LEO	CE	462	9.9/2.6	297/297/28.5	462	9.9
23	KSC	Delta 300	LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5	982	21.4
			LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5		
24	KSC	THHD7/BI	LOG MOD	Logistic Module	LCE	26 300	28.0/14.0	270/270/55	26 300	28.0
25	WTR	THHB/C	NN/D-11	Earth Resources Sat - LEO	LCE	6 630	36.1/10.2	500/500/97	6 630	36.1
26	WTR	THHB/C	EO-8(1)	Earth Obs. Sat.	LCE	4 758	13.5/12.2	500/500/98	4 758	13.5
27	WTR	THHB/A	AST-10(6)	Explorer	LCE	4 075	13.0/11.3	200/200/90	4 075	13.0
28	KSC	THHB/A	NN/D-16 C(2)	Com/Nav	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1989 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi. /n. mi. /deg)	Weight (lb)	Length (ft)
29	KSC	THHM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
30	KSC	THHM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
31	KSC	THHM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
32	KSC	THHM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
33 _D	WTR									
34 _D	WTR									
35 _D	WTR									
36 _D	WTR									
37 _D	WTR									
38 _D	WTR									
39 _D	KSC									
40 _D	KSC									
41 _D	KSC									
42 _D	KSC									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1989 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
43 _D	KSC									
44 _D	WTR									
45 _D	WTR									
46 _D	WTR									
47 _D	WTR									
48 _D	WTR									
49 _D	WTR									
50 _D	WTR									
51 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1990										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
1	KSC	THHD/C	NN/D-9	Foreign Geosyn. Met. Sat.	CE	596	8.0/6.0	Syn. Eq.	5 287	29.8
			NN/D-4	Traffic Management	CE	703	12.0/7.2	Syn. Eq.		
			NN/D-1	Intelsat	CE	3 988	9.8/8.3	Syn. Eq.		
2	KSC	THHD/C	NN/D-1	Intelsat	CE	3 988	9.8/8.3	Syn. Eq.	7 397	28.4
			NN/D-12	Earth Resources-Syn.	CE	2 668	8.7/7.4	Syn. Eq.		
			NN/D-5	Foreign Comsat.	CE	741	9.9/5.8	Syn. Eq.		
3	KSC	THHD/C	NN/D-1	Intelsat	CE	3 988	9.8/8.3	Syn. Eq.	6 656	18.5
			NN/D-12	Earth Resources-Syn	CE	2 668	8.7/7.4	Syn. Eq.		
4	KSC	THHD/C	NN/D-2B	U.S. Dom. Com. Sat.-B	CE	3 988	9.8/8.3	Syn. Eq.	5 937	21.1
			NN/D-3	Disaster Warning Sat.	LCE	1 949	11.3/8.0	Syn. Eq.		
5	KSC	THHD/C	NN/D-2B	U.S. Dom. Com. Sat-B	CE	3 988	9.8/8.3	Syn. Eq.	3 988	9.8
6	KSC	THHD/C	NN/D-6	Communications R&D Sat.	LCE	3 871	13.1/11.6	Syn. Eq.	3 871	13.1
7	KSC	Delta 300	EOP-9	Magnetic Mon. Sat.	LCE	847	10.1/5.6	1080/540/28.0	847	10.1
8	WTR	Delta 300	Phy-1A	Explorer-Upper Atmosphere	CE	1 240	11.0/4.0	1900/140/90	1 240	11.0
9	WTR	Delta 300	NN/D-8	Environ. Mon. Sat.	CE	1 414	13.0/8.0	920/920/103	1 414	13.0
10	WTR	Delta 300	EO-5C	Special Purpose Sat. Polar	LCE	675	9.7/4.7	280/280/90	675	9.7
11	WTR	Delta 300	EOP-8	Vector Magnetometer Sat.	LCE	1 101	10.4/6.0	216/216/90	2 202	20.8
			EOP-8	Vector Magnetometer Sat.	LCE	1 101	10.4/6.0	216/216/90		
12	WTR	Delta 300	EOP-8	Vector Magnetometer Sat.	LCE	1 101	10.4/6.0	216/216/90	1 101	10.4

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1990 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
13	KSC	Delta 304	Phy-1B	Explorer-Medium Altitude	CE	641	10.5/5.0	20000/1000/28.5	641	10.5
14	KSC	THHD/BII	AST-6	LST	CE	20 639	36.3/12.0	340/340/28.5	20 639	36.3
15	KSC	THHD7/C/BII	PL-23	Jupiter Sat. Orbiter/Lander	CE	21 909	29.5/15.0	-	21 909	29.5
16	KSC	THHC	AST-10(2)	Infrared Astr.	LCE	21 000	12.0/8.0	700/700/28.5	21 000	12.0
17	KSC	THHC	AST-10(3)	Ultraviolet Astr.	LCE	13 000	8.0/6.0	700/700/28.5	13 000	8.0
18	KSC	THHC	AST-11	Solar Physics EOSO	LCE	19 000	12.0/8.0	550/550/28.5	19 000	12.0
19	WTR	THHD7	Phy-7(4)	Auroral Observatory	LCE	20 000	15.0/8.0	200/200/90	20 000	15.0
20	KSC	THHD	AST-5	HEAO-D&E	CE	16 985	19.0/14.0	200/200/28.5	16 985	19.0
21	KSC	THHD	ST-1	Long Duration Exposure Facility	CE	10 200	37.0/14.0	270/270/28.5	10 200	37.0
22	KSC	THHD	Phy-7(2A)	Particle Inject.	LCE	20 000	15.0/8.0	200/200/28.5	20 000	15.0
23	KSC	THHD	Phy-7(3A)	Atmospheric Science	LCE	20 000	15.0/8.0	200/200/28.5	20 000	15.0
24	KSC	Delta 904	Phy-7(5)	Chemical Release	LCE	2 405	10.9/9.0	Sub-orbital/28.5	2 405	10.9
25	KSC	Delta 904	Phy-7(5)	Chemical Release	LCE	2 405	10.9/9.0	Sub-orbital/28.5	2 405	10.9
26	WTR	THHB/C	EO-3C	EOS-C	LCE	6 630	36.0/10.2	494/494/99	6 630	36.0
27	WTR	THHB/C	NN/D-16A(1)	Earth Obs.	LCE	6 635	45.0/10.0	500/500/98	6 635	45.0
28	WTR	THHB/C	EOP-10(1)	EOPAP-Ocean Dynamics	LCE	4 758	13.5/12.3	450/450/90	4 758	13.5

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1990 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
29	WTR	THHB/A	NN/D-14	Global E. & O. Mon. System	LCE	4 908	13.6/12.5	200/200/98	4 908	13.6
30	WTR	THHB/A	NN/D-14	Global E. & O. Mon. System	LCE	4 908	13.6/12.5	200/200/98	4 908	13.6
31	WTR	THHB/A	NN/D-14	Global E. & O. Mon. System	LCE	4 908	13.6/12.5	200/200/98	4 908	13.6
32	KSC	THHB/A	AST-3	Solar Physics Mission	LCE	4 281	13.1/11.6	270/270/30	4 281	13.1
33	KSC	THHB/A	NN/D-16B(5)	Astronomy	LCE	4 075	13.0/11.3	700/700/28.5	4 075	13.0
34	KSC	THHB/A	C/N-4	Comm/Nav.	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
35	KSC	THHD/C	Phy-3B	Environ. Pert. Sat.-B	CE	8 874	15.5/10.0	6900/6900/55	8 874	15.5
36	KSC	THHD/C	PL-8	MSSR	CE	8 913	28.7/15.0	-	8 913	28.7
37	KSC	THHD/C	LUN-5	Lunar Sample Return	CE	11 500	24.0/10.0	-	11 500	24.0
38	KSC	Delta 300	AST-1A	Explorer-LEO	CE	462	9.9/2.6	297/297/28.5	462	9.9
39	KSC	Delta 300	LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5	982	21.4
			LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5		
40	KSC	THHD7/BII	LOG MOD	Logistic Module	LCE	26 300	28.0/14.0	270/270/55	26 300	28.0
41	WTR	THHB/C	NN/D-11	Earth Resources Sat-LEO	LCE	6 630	36.1/10.2	500/500/97	6 630	36.1
42	WTR	THHB/C	EO-8(1)	Earth Obs. Sat.	LCE	4 758	13.5/12.2	500/500/98	4 758	13.5
43	KSC	THHB/A	AST-10(6)	Explorer	LCE	4 075	13.0/11.3	200/200/28.5	4 075	13.0

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1990 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
44	KSC	THIB/A	NN/D-16 C(2)	Com/Nav	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
45	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
46	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
47	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
48	KSC	THIM	BIG G/CPM	BIG G/CPM-Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
49 _D	WTR									
50 _D	KSC									
51 _D	KSC									
52 _D	KSC									
53 _D	KSC									
54 _D	KSC									
55 _D	KSC									
56 _D	KSC									
57 _D	KSC									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1990 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
58 _D	KSC									
59 _D	KSC									
60 _D	WTR									
61 _D	WTR									
62 _D	WTR									
63 _D	WTR									
64 _D	WTR									
65 _D	WTR									
66 _D	WTR									
67 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1991										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
1	KSC	THHD/C	NN/D-1	Intelsat	CE	3 988	9.8/8.3	Syn. Eq.	7 397	28.4
			NN/D-13	Foreign SEOS	CE	2 668	8.7/7.4	Syn. Eq.		
			NN/D-5	Foreign Comsat.	CE	741	9.9/5.8	Syn. Eq.		
2	KSC	THHD/C	NN/D-1	Intelsat	CE	3 988	9.8/8.3	Syn. Eq.	5 065	20.7
			NN/D-10	Geosyn. Oper. Mct. Sat.	LCE	1 077	10.9/7.2	Syn. Eq.		
3	KSC	THHD/C	NN/D-2B	U.S. Dom. Com. Sat. - B	CE	3 988	9.8/8.3	Syn. Eq.	3 988	9.8
4	KSC	THHD/C	EO-4B	SEOS - Oper.	LCE	5 168	13.8/12.9	Syn. Eq.	5 168	13.8
5	KSC	THHD/C	EO-4B	SEOS - Oper.	LCE	5 168	13.8/12.9	Syn. Eq.	5 168	13.8
6	WTR	Delta 300	Phy-1A	Explorer - Upper Atmosphere	CE	1 240	11.0/4.0	1900/140/90	1 240	11.0
7	WTR	Delta 300	NN/D-8	Environ. Mon. Sat.	CE	1 414	13.0/8.0	920/920/103	1 414	13.0
8	WTR	Delta 300	EO-5D	Special Purpose Sat. Polar	LCE	675	9.7/4.7	400/400/90	675	9.7
9	KSC	Delta 304	Phy-1B	Explorer - Medium Altitude	CE	641	10.5/5.0	20000/1000/28.5	641	10.5
10	KSC	THHD-7/C	Phy-5	Cosmic Ray Lab.	CE	46 757	45.0/14.0	200/200/28.5	46 757	45.0
11	KSC	THHD-7/C/ BII	PL-23	Jupiter Sat. Orbiter/Lander	CE	21 909	29.5/15.0	—	21 909	29.5
12	KSC	THHC	Ast-8	LRO	CE	2 432	25.5/10.0	38646/38646/28.5	2 432	25.5
13	WTR	THHC	Ast-10(1)	Infrared Astr.	LCE	21 000	12.0/8.0	700/700/90	21 000	12.0

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1991 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
14	KSC	THHD-7	Ast-7	LSO	CE	24 147	60.0/15.0	190/190/28.5	24 147	60.0
15	KSC	THHD	Ast-9A	Focusing X-Ray Telescope-A	CE	16 985	19.0/14.0	270/270/28.5	16 985	19.0
16	WTR	THHB/C	EO-3B	EOS - B	LCE	6 630	36.0/10.2	494/494/99	6 630	36.0
17	KSC	THHB/A	EOP-10(2)	EOPAP - Earth Dynamics	LCE	4 758	13.5/12.3	450/450/28.5	4 758	13.5
18	KSC	THHB/A	Ast-10(4)	UV Astr. Survey	LCE	4 075	13.0/11.3	200/200/28.5	4 075	13.0
19	KSC	THHB/A	Ast-10(5)	X-Ray & UV Astr.	LCE	4 075	13.0/11.3	700/700/28.5	4 075	13.0
20	KSC	THHD/C	Phy-2B	Gravity/Relativity Sat.-B	LCE	1 372	12.0/9.3	—	1 372	12.0
21	KSC	THHD/C	PL-8	MSSR	CE	8 913	28.7/15.0	—	8 913	28.7
22	KSC	THHD/C	LUN-5	Lunar Sample Return	CE	11 500	24.0/10.0	—	11 500	24.0
23	KSC	Delta 300	Ast-1A	Explorer - LEO	CE	462	9.9/2.6	297/297/28.5	462	9.9
24	KSC	Delta 300	LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5	982	21.4
			LS-1	Life Science Module	LCE	491	10.7/2.2	300/300/28.5		
25	KSC	THHD-7/BII	LOG-MOD	Logistic Module	LCE	26 300	28.0/14.0	270/270/55	26 300	28.0
26	WTR	THHB/C	NN/D-11	Earth Resources Sat. - LEO	LCE	6 630	36.1/10.2	500/500/97	6 630	36.1
27	WTR	THHB/C	EO-8(1)	Earth Obs. Sat.	LCE	4 758	13.5/12.2	500/500/98	4 758	13.5
28	WTR	THHB/A	Ast-10(6)	Explorer	LCE	4 075	13.0/11.3	200/200/90	4 075	13.0

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Continued)

Year 1991 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi./n. mi./deg)	Weight (lb)	Length (ft)
29	KSC	THIB/A	NN/D-16 C(2)	Com./Nav.	LCE	4 758	13.5/12.3	200/200/28.5	4 758	13.5
30	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
31	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
32	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
33	KSC	THIM	BIG G/CPM	BIG G/CPM - Crew Rotation and Log	LCE	36 000	42.8/15.8	270/270/55	36 000	42.8
34 _D	WTR									
35 _D	WTR									
36 _D	WTR									
37 _D	WTR									
38 _D	WTR									
39 _D	KSC									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE L/V CARGO MANIFEST (Concluded)

Year 1991 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n. mi. /n. mi. /deg)	Weight (lb)	Length (ft)
40 _D	KSC									
41 _D	KSC									
42 _D	KSC									
43 _D	WTR									
44 _D	WTR									
45 _D	WTR									
46 _D	WTR									
47 _D	WTR									
48 _D	WTR									
49 _D	WTR									
50 _D	WTR									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 6. EXPENDABLE LAUNCH VEHICLE TRAFFIC SUMMARY
BEST MIX EXPENDABLE PAYLOADS
NASA/NON-NASA

EXPENDABLE LAUNCH VEHICLE	LAUNCH SITE	NO. OF LAUNCHES													TOTALS
		80	81	82	83	84	85	86	87	88	89	90	91		
SCOUT	KSC WTR	4 2					4 2							8 4	
DELTA 300	KSC WTR	2 2	3 5	2 2	2 0	2 2	2 2	3 3	2 2	2 3	2 1	3 5	2 3	27 30	
DELTA 900	KSC WTR	1	0	1	1	0	0	0	1	0	0	0	0	4	
DELTA 304	KSC WTR	1	1	0	1	1	1	0	1	1	1	1	1	10	
DELTA 904	KSC WTR			1			2		2			2		6 1	
TIIB/C	KSC WTR					1 5		1 3						2 48	
TIID7	KSC WTR	5	0	1	0	1	2 2	4	1 2	0 1	3	0 1	1	18 6	
TIIB/A	KSC WTR	5	2	4	7 1	5	3 1	6 3	5 1	7 3	4 1	5 3	4 1	57 14	
TIIB/C/BI	KSC WTR	1	2	0	1	0	1	1	0	0	0	0	0	6	
TIID	KSC WTR	1 1	1	2	2	3	1	2	1	2	0	4	1	20 1	
TIID/BI	KSC WTR	1		1		1		1		1		1		6	
TIID/C	KSC WTR	4	6	3	5	4	5	7	8	7	8	9	8	75	
TIIM	KSC WTR	2	4	4	4	4	4	4	4	4	4	4	4	46	
TIID7/BI	KSC WTR	1	1	1	1	1	1	2	1	1	1	1	1	13	
TIID7/C	KSC WTR	0	2	0	0	2	0	0	1	0	1	0	1	7	
TIID7/C/BI	KSC WTR	1	1	0	0	2	4	2	0	1	0	1	1	13	
TIIC	KSC WTR	1	2	3 1	1 1	4	2 1	3	1 1	3	2 1	3	1	6	
TOTAL		40	33	31	31	38	43	47	37	41	32	48	33	454	

TABLE 7. EXPENDABLE LAUNCH VEHICLE TRAFFIC SUMMARY
 BEST MIX EXPENDABLE PAYLOADS, NASA/NON-NASA/DOD

		LAUNCH SITE	NO. OF LAUNCHES												
			80	81	82	83	84	85	86	87	88	89	90	91	TOTAL
DOD		KSC	8	3	6	7	10	4	5	7	7	4	9	3	
		WTR	14	12	12	16	11	17	12	13	12	15	10	14	
	SUB-TOTAL		22	15	18	23	21	21	17	20	19	19	19	17	231
NASA NON- NASA		KSC	29	25	21	25	31	32	36	27	29	26	34	25	
		WTR	11	8	10	6	7	11	11	10	12	6	14	8	
	SUB-TOTAL		40	33	31	31	38	43	47	37	41	32	48	33	454
SUB-TOTAL			62	48	49	54	59	64	64	57	60	51	67	50	685
ABORT FLIGHTS			6	5	5	5	6	6	6	6	6	5	6	5	67
TOTAL			68	53	54	59	65	70	70	63	66	56	73	55	752

APPENDIX

EXPENDABLE LAUNCH VEHICLE FLEET CHARACTERISTICS

Table A-1 lists the expendable launch vehicles used in this analysis. Included is a brief description of each vehicle with its size and payload performance given either to a 270 n. mi. circular orbit or to synchronous equatorial orbit.

Even though some of the vehicles have not been developed, it was determined that this was the least costly fleet, even with the consideration and inclusion of the development costs, where required. The Titan III was the basic launch vehicle. The Atlas/Centaur was a candidate launch vehicle, however, it was not cost effective due to the high launch rate of the Titan.

The undeveloped launch vehicles are considered to be within the current technology capability.

TABLE A-1. DESCRIPTION AND CHARACTERISTICS OF THE EXPENDABLE LAUNCH VEHICLES USED

Launch Vehicle	Description	Typical Payload Capability (1) lb	Total Launch Vehicle Length (2) ft	Launch Vehicle Diameter (3) ft
SCOUT	4-stage guided booster using SRMs capable of launching low mass payloads on orbital, re-entry, and probe missions	340 1a	22.9	3.3
Delta 300	2-stage storable propellant booster with 3 Castor II augmentation motors on standard long tank Thor with standard second stage for small to medium payloads	2500 1a	106.3	8.0
Delta 304	Delta 300 plus TE 364-4 motor third stage	435 1b	106.3	8.0
Delta 600	same as Delta 300 except with 6 Castor II augmentation motors	2750 1a	106.3	8.0
Delta 604	Delta 600 plus TE 364-4 motor third stage	475 1b	106.3	8.0
Delta 900	same as Delta 300 except with 9 Castor II augmentation motors	3600 1a	109.5	8.0
Delta 904	Delta 900 plus TE 364-4 motor third stage	520 1b	109.5	8.0
T-IIIB/A	standard two stage (Core I and Core II) storable propellant booster for medium payloads plus storable propellant Agena third stage	820 1b	156	10.0
T-IIIB/C	Tital III B plus cryogenic Centaur third stage	1100 1b	156	10.0

TABLE A-1. DESCRIPTION AND CHARACTERISTICS OF THE EXPENDABLE LAUNCH VEHICLES USED (Continued)

Launch Vehicle	Description	Typical Payload Capability (1) lb	Total Launch Vehicle Length (2) ft	Launch Vehicle Diameter (3) ft
T-III B/C/BII	Titan III B/C plus SRM Burner II fourth stage	1800 1b	164	10.0
T-IIIC	standard Core I and Core II booster plus storable propellant Transtage third stage with two strap-on 5-segment, 120-inch diameter SRMs for boost augmentation	2900 1b	180	10.0
T-IIID	same as T IIIC except Transtage removed	17000 1a	154	10.0
T-IIID/BII	Titan IIID plus Burner II stage	27000 1a	154	10.0
T-IIID/C	Titan IIID plus Centaur stage	7600 1b	154	10.0
T-IIID/C/BII	Titan IIID plus Centaur and Burner II stages	7600 1b	154	10.0
T-IIID7	New booster requiring development of a new stretched Core I and two new 7-segment, 120-inch SRMs for boost augmentation with existing standard Core II	28500 1a	164	10.0
T-IIID7/BII	Titan IIID7 plus Burner II stage	3400 1b	164	10.0
T-IIID7/C	Titan III D7 plus Centaur stage	10200 1b	164	10.0

TABLE A-1. DESCRIPTION AND CHARACTERISTICS OF THE EXPENDABLE LAUNCH VEHICLES USED (Concluded)

Launch Vehicle	Description	Typical Payload Capability (1) lb	Total Launch Vehicle Length (2) ft	Launch Vehicle Diameter (3) ft
T-III D7/C/BII	Titan III D7 plus Centaur and Burner II stages	10200 1b	164	10.0
T-IIIM	New booster requiring development of a man-rated version of Titan III D7	36000 1a	180	10.0

NOTES:

- (1) (a) launched due East into 270 Nautical mile circular orbit
(b) synchronous equatorial orbit
- (2) overall launch vehicle length with standard payload fairing
- (3) nominal launch vehicle diameter of primary (core) stages.

APPROVAL

THE OCTOBER 1973 EXPENDABLE LAUNCH VEHICLE TRAFFIC MODEL

By Shuttle Utilization Planning Office

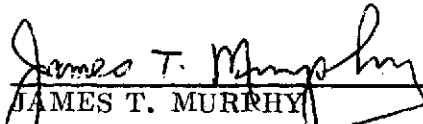
The information in this report has been reviewed for security classification. Review of any information concerning Department of Defense or Atomic Energy Commission programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

This document has also been reviewed and approved for technical accuracy.



WILLIAM A. HUFF

Manager, Shuttle Utilization Planning Office
Program Development



JAMES T. MURPHY

Director, Program Development